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Colstrip Hearings

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WEDNESDAY, FEBRUARY 11, 1976

The hearing reconvened at 9:10 A.M. on Wednesday, February 11, 1976, in the Chambers of the Montana House of Representatives, State Capitol, Helena, Montana.

The Honorable Carl M. Davis, Hearings Examiner, presided over the proceedings.

APPEARANCES:

Applicants:

William M. Bellingham, Esq.
John L. Peterson, Esq.
John Ross, Esq.

Department of Natural Resources and Conservation:

Arden E. Shenker, Esq.
Donald MacIntyre, Esq.

International Brotherhood of Electrical Workers (AFL-CIO)

Benjamin W. Hilley, Esq.

The following proceedings were had:

HEARINGS EXAMINER: Mr. Crosswhite will start. Mr. Joe Crosswhite, it's my understanding that you wish to be here as a public witness, as a proponent, and that you filed a written statement, which we'll file in the record.

JOE CROSSWHITE, appearing as a public witness, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

HEARINGS EXAMINER: Would you give the reporter your address, please, Mr. Crosswhite?

MR. CROSSWHITE: Box 96, Columbia Falls, Montana.

(THE WRITTEN DIRECT TESTIMONY OF MR. JOE CROSSWHITE WAS DIRECTED TO BE INSERTED AT THIS POINT.)

STATEMENT OF TESTIMONY OF

JOE CROSSWHITE

My name is Joe Crosswhite, International Representative of the International Union of Operating Engineers, AFL-CIO. Part of my area is the State of Montana, and I have lived in Montana since 1915. I have been on the International staff for eleven years; prior to that time I was business manager of our local in Western Montana for 14 years. With this background in the industry, I am in a position to testify regarding the employment of operating engineers and the unemployment in the industry.

Unemployment among operating engineers in Montana is serious since there are presently no large projects going. Libby Dam is almost completed, we have only 30 or 40 men left there; we have lost about a third of our membership at the Anaconda operations in Butte and Anaconda; new highway construction is way down because of lack of federal funds. We have approximately 5,000 members in the State of Montana and some 3,000 of them are either unemployed here in Montana or have had to go out of state for jobs, although they are Montana residents.

In the construction of Colstrip Units 1 and 2 there were approximately 200 members of the operating engineers employed. There would be about the same number of jobs involved in the construction of Units 3 and 4.

In addition to the construction jobs on Colstrip 3 and 4, operating engineers are involved in building the transmission lines; we clear the rights of way, build the service roads and do the craning of the transmission towers, and other work within our jurisdiction.

The only encouraging thing in the employment picture is the construction of Colstrip Units 3 and 4 and related work; there are no other possibilities nearly that far advanced.

There have been questions to other union witnesses as to whether alternatives to Colstrip 3 and 4 have been considered. The Operating Engineers believe if Colstrip 3 and 4 are not built the suggested alternatives will not be possible. For example, if the generating facilities are built outside of Montana, they will probably use Wyoming coal, not Montana coal, for the tax rate in Wyoming is much lower than that in Montana, as demonstrated by the fact that some fourteen new strip mining pits are opening this year (1976) in Wyoming and no new mines are planned in Montana. We presently have about 400 operating engineers working in coal mining and reclamation in Montana. If Colstrip 3 and 4 are built there would probably be about 125 additional jobs in coal mining and reclamation.

The alternative of shipping coal by rail to generating facilities to the west has been mentioned. This, however, probably would not happen, for the railroads are very close to capacity now. Therefore, the coal would probably be moved by slurry pipeline; this would involve a few jobs in its construction, but practically no jobs at all in the operation and maintenance. Furthermore, it would use tremendous amounts of water, which can not be spared from Montana, and which would not be returned or recycled to use in Montana.

My members are involved in the reclamation of strip mines in Eastern Montana and from my own observation many improvements are being made in reclamation. In the long run, the land may well be in better condition, better suited for various agricultural uses, than it was before the coal mining took place.

Historically, Montana has been in a colonial status with our raw materials shipped out of state. Generating power at Colstrip 3 and 4 would be an opportunity to use our raw materials right here at home. Furthermore, we would have better opportunities to attract some clean industries to Montana if we had adequate power available in the state.

In addition to my position in the labor movement, I am president of Western Environmental Trade Association, a group of labor and industry representatives to support various projects in order to provide environmentally sound jobs in Montana. This organization is also supporting the construction of Colstrip 3 and 4.

HEARINGS EXAMINER: You may cross-examine, Mr. Shenker.

EXAMINATION OF JOE CROSSWHITE

Cross, by Department of Natural Resources and Conservation, By Mr. Shenker:

Q When did you prepare your written statement, Mr. Crosswhite?

A Sir, when did I?

Q Yes.

A Yesterday.

Q When?

A Yesterday afternoon.

Q Who typed it?

A A secretary. I don't know who typed it. It was after I finished it, then it was typed.

Q Where?

A I couldn't even tell you that.

Q Who took it from you to have it typed?

A One of our attorneys.

Q Who was that?

A Emily Loring.

Q From Mr. Hilley's law firm?

A Yes.

Q You say one of our attorneys. Whom does Mr. Hilley's law firm represent?

A I'll take that back. One of IBEW's attorneys.

Q Oh, I see. Was that over at the Colonial Hotel where the applicants are staying?

A What do you mean over at the Colonial club?

Q Colonial Hotel.

A Or Colonial Hotel. What do you mean?

Q Is that where the conversations took place?

A Some of them, yes.

Q Did anyone give you any assistance in putting your statement together, sir?

A No one except the IBEW attorney.

Q The IBEW attorney, who is here again. Well, Mr. Crosswhite, tell me, when did you decide that you wanted to come here and testify as a public witness?

A About a week after this hearing started, a year or so ago.

Q Indeed. When did you first tell Mr. Davis or anyone connected with this hearing that you were coming as a witness?

A I didn't contact Mr. Davis. I was assigned in by our international to assist wherever possible, to assist in conjunction with the IBEW international.

Q Did you ever tell anybody outside the IBEW that you were planning to come in as a witness?

A Yes.

Q Who?

A Well, I can't recall. Anybody that asked me I said I was expecting to be a witness. I can't recall exactly who it was.

Q Did you tell anybody on behalf of the applicants in this proceeding?

A No, not to my knowledge. I can't recall it. Are you speaking of Montana Power, for instance?

Q Yes, for instance.

A I haven't talked to anybody in the Montana Power for a year or so.

Q You didn't tell Mr. Hilley's firm, or anyone else who you knew was aware of the fact that you were coming to testify, to keep that matter a secret, did you?

A There's no secret. I don't know why it would be a secret.

MR. HILLEY: I'm going to object to this line of questioning. If these witnesses that are going to give public statements are going to be harassed this way, now this is really out of order. It's immaterial, it's certainly irrelevant.

HEARINGS EXAMINER: Sustained.

MR. SHENKER: What was sustained, Mr. Davis? I don't have a question pending at the moment.

HEARINGS EXAMINER: What was your formal objection?

MR. HILLEY: To the entire line of questioning.

MR. SHENKER: I'd like to be heard on that.

HEARINGS EXAMINER: Well, we're going to hear questioning on the line as far as -- to a limited extent, but I think after you get the first ten or twenty questions on the subject, I don't think we need to fill the record with any more than that.

MR. SHENKER: I quite agree.

Q You've had, sir, well over a year, I suppose, in which to prepare your testimony for this proceeding, is that a fair calculation?

HEARINGS EXAMINER: Now Mr. Shenker, we've advised the public witnesses they were not required to prepare written testimony for this hearing if they're public witnesses.

MR. SHENKER: I'm not talking about written testimony, Mr. Davis, I'm talking about the preparation for the hearing.

HEARINGS EXAMINER: I see. Very well.

Q Do you recall the question, Mr. Crosswhite?

A No, repeat it, would you, please?

Q Sure. You've had about a year in which to prepare your testimony for this proceeding?

A About a year, approximately.

Q What have you done to prepare yourself for this testimony?

A I haven't done very much writing. I've done a lot of thinking and so forth, and I pretty well knew what I was going to say when I came here yesterday. In fact, this statement here is, I would say, solely my own idea, and own opinions.

Q Good. Have you had any opportunity to engage in conservations with people who are involved in the Colstrip project in one way or another, in order to sharpen your thinking?

A Well, I don't quite understand what you mean. People that are building Colstrip 1 and 2, I've had a lot of relations with them, and a lot of potential workers that's going to be on Colstrip 3 and 4, if and when they're built. If that's what you mean.

Q What I have in mind, Mr. Crosswhite, you say in your statement that the only encouraging thing in the employment picture is the construction of Colstrip units 3 and 4 and related work. Now, with whom have you conversed in order to determine how far advanced that work would be, as compared to anything else in the world?

A The contractor that supposedly is going to build it. The contractor that's on the premises down there now: Bechtel Corporation. They've had a couple of pre-job conferences with us.

Q Who?

A Bechtel Corporation.

Q That's a corporation. Who on behalf of the corporation?

A Well, the labor relations department.

Q Do you recall any names?

A Joe Sams. He's a labor relations man out of San Francisco.

Q That's all?

A That's the only one I can recall offhand. I go to quite a few conferences, or pre-job meetings, and if I had a little time to think, I could tell you, maybe, who all was there.

Q Do you know of any construction projects planned in the state of Montana at any time within the next three years?

A There is some that's planned, but they're still -- they haven't come off of the drawing board yet. The only one that I know of of any size is Colstrip, and I'm under the impression that it's pretty well along on the planning of it, and so forth, if they ever get the go-ahead to build it.

Q When is the next construction project planned for Montana other than Colstrip?

A The only one I know of that's -- and it's in its infancy so far, is the MHD project in Butte. And that's in its infancy yet. They just started hiring the engineers and so forth.

Q How many construction workers are members of your union?

A Of construction workers?

Q Yes.

A We have about 5,000 total in the state of Montana, and I would say between 35 and 38 hundred. Now that's approximate. I couldn't tell you exactly, because they can switch back and forth.

Q That's fine. Of your 3500 to 3800 workers, how many are employed right now?

A How many are employed or unemployed?

Q Either.

A The biggest, and by far the vast majority, are unemployed.

Q 2500? 3,000?

A I would say a minimum of 2,000. A minimum of 2,000, that's --

Q How many of them would you expect to have employed as soon as the construction weather season begins in Montana, aside from the Colstrip project?

A In 1976, the weather isn't going to have much to do with it, because we have no projects. Our highway construction is way down. There's four pretty good jobs thatwere going to be let in January. They were pulled. There was nothing let in January except a couple of crushing jobs. The backbone of our industry is highway construction, and there's none of that, so when there isn't any of that, there isn't much of anything else. And there is no big industrial projects for '76, unless Colstrip comes on.

Q How about the small ones?

A The small ones, there isn't very many. What are you talking about? Digging a basement for a two bedroom home, or what?

Q Well, I don't know. How many of your workers do you expect to have employed this year on construction projects on any size?

A It's very dismal, I can tell you that, as far as construction work.

Q How many of the 2,000 unemployed workers in your union worked on Colstrip units 1 and 2?

A Somewheres in the area of 200. That could be more or less. That's approximate.

Q Okay. Now, in your statement, also, Mr. Crosswhite, you say that if Colstrip 3 and 4 are built, there would be additional jobs in coal mining and reclamation. How do you know that?

A Because it would take more coal.

Q Well, Mr. Crosswhite, do you know how much coal was dug in Montana last year?

A I've read the figures, but I couldn't tell you off the top of my head right now. I think it was 11 million tons, but I'm not sure. That figure sticks in my mind, but I could be wrong.

Q Do you know what the comparison is between the amount of coal strip-mined last year and the amount of coal strip-mined five years ago?

A It was a lot more in '75 than there was five years ago, yes.

Q Do you know what the projections are for the amount of coal to be strip-mined in Montana without Colstrip 3 and 4 between now and 1980?

A I've read what the projections were, but I don't -- in my own opinion, I don't know whether they're accurate or not.

Q You were here yesterday for some of the day, Mr. Crosswhite. Did you hear Paul Polzin testify?

A Just part of it. Not enough to say I listened to the testimony.

Q Did you hear the part about the natural market area that the Montana coal fields would have to the east of here?

A I did not. All I heard was the part on the power lines, something about three or four different kinds of ice.

Q Do you know how many contracts presently are in force for the shipment of coal from Montana to power companies to the east of Montana?

A I don't know how many. It's information that would be available. I guess it's public as far as that's concerned, but I couldn't tell you off the top of my head. There's been one or two in the last year or two renewed, but most of them are long-term contracts.

Q You don't know how many there are, approximately?

A I do not.

Q You don't know how much tonnage they represent?

A No. I couldn't tell you unless I studied the statistics, and I haven't done that.

Q Well, you would agree with me, would you not, Mr. Crosswhite, that there will be additional jobs in coal mining if there is additional coal dug?

A Correct.

Q That would be true irrespective of where the coal went. The mining depends upon the digging of the coal, not its destination?

A Not necessarily. It may not be dug in Montana, if it wasn't used in Montana.

Q Well, your friend Mr. Williams who was here again today had some problems with my asking him to assume things. You're not supposed to fight the assumptions, Mr. Crosswhite, but if it is true, sir, that the coal once dug will go somewhere -- I want you to accept that, Mr. Crosswhite, please don't fight that.

A If they dug it, yes, I'll assume that part.

Q Good. Then the jobs will depend upon the digging and not the destination; isn't that true?

A Well, they won't dig it if they haven't got a destination for it.

Q You're fighting the assumption.

A Well, I don't know what you're saying, fighting the assumption. I'm just taking plain, ordinary sense, and what the heck would happen if they couldn't sell the coal, they wouldn't dig it. Now, I would like to see the companies do that. Regardless of the market, I would like to see them keep a full crew on working, but they don't do that.

Q Somebody must have made a decision that it's worth digging the coal if the decision is made, indeed, to dig the coal. So, it's not for you and me to wonder why the Western Energy Company, or the Decker Coal Company, or the Peabody Coal Company, the Westmoreland Coal Company, or any of the coal companies that dig the coal decide why they wanted to dig the coal. We have to assume that they are making decisions that are rational decisions. Once they've made those decisions, the digging of the coal itself provides the jobs from the mining; isn't that true?

A That is true. But, we don't know whether to continue digging it in Montana. Can I give you a comparison between Montana and Wyoming?

Q By all means.

A In Montana, there hasn't been a new camp since Westmoreland at Sarpy Creek, which started lifting coal about two years ago. There's no prospects in a minimum of five years, because it takes five years after they start any kind of exploratory work, and getting their equipment together, so there won't be any new mining camps in the state of Montana for a minimum of five years. In a comparison with Wyoming, there's fourteen new mining camps starting in 1976.

Q How much coal did Wyoming dig in 1970?

A I couldn't tell you offhand. I haven't got the statistics on tonnage on any of them offhand. I have it at home, or in some of my material, but I haven't got it with me.

Q What state has more coal than any other in the United States?

A I don't know, but the most coal is in the northwest.

Q Northwest. Where in the northwest?

A Montana, Wyoming, the Dakotas, and Washington, British Columbia.

Q Well, among Montana, Wyoming, the Dakotas, and British Columbia, which of those has the most coal?

A I don't know which one has the most, but I know the one that's mining the most, and that's Wyoming. And they don't act like they're going to run out tomorrow, either.

Q Would you be surprised to find, Mr. Crosswhite, that the amount of coal production in Montana over a period of five years, increased by over 2,000%?

A In five years?

Q Yes. The most recent five years.

A I would believe that, because five years ago, there was very little coal mined anyplace. It's just been since the shortage of power that they've reverted to coal for producing power. Up until that time, nobody was buying any coal.

Q Mr. Crosswhite, in 1969, there were one million tons produced of coal in Montana. In 1975, there were 21.5 million tons produced in coal in Montana. And in none of those years was Colstrip units 1 or 2 operating. Now, that doesn't give you any pause, does it, from your conclusions you've reached for your testimony?

A Repeat that question.

Q We'll just withdraw it, Mr. Crosswhite. You also state in your prepared testimony from yesterday, sir, that the railroads are very close to capacity now, presumably meaning that the railroads couldn't haul any more coal if they wanted to. Who from the railroads told you that?

A Well, I've had some from the railroad brotherhoods or unions tell me that, and I've read it in newspapers. During the wheat harvest in Montana you can't get cars for loading wheat. I come from a logging and lumber part of Montana. They can't get cars for getting rid of the lumber shipment. Well, if they can't get cars, they sure as hell -- pardon me -- there must be an overload on the railroads now, without having, maybe, seven or eight units of coal shipped on the same tracks. They're all single tracks through the mountains in Montana.

Q Are you familiar with the officers of the Burlington Northern Railroad? Do you know any of them?

A I know -- I wouldn't say that I could go in their front office and they'll call me Joe, no. But I have met them, some of them.

Q What would you call them?

A Oh, like the president, on down to the janitor.

Q Mr. Crosswhite, while you read the newspapers of what's new in the railroads, have you read the announcement by the president of the Burlington Northern Railway that they are prepared to handle the increased capacity for unit train hauling of coal as projected by the Montana Energy Advisory Council?

A I possibly could have read it, yes. I'm not contradicting it, that he made the statement. Anybody's that's looking for business is going to make a lot of statements.

Q But you don't think the statements that they're looking for business are true, because they just don't have the capacity to perform; is that your view?

A That's my view, yes. On single track railroads they can only haul so much freight until they reach their capacity.

Q Do you know Mr. George Powe?

A No.

Q Do you know that he has made a sworn statement in this proceeding in his capacity as an officer of the Burlington Northern Railway, with respect to its ability to move coal by rail in substantially increased amounts?

A I didn't know that.

Q Would that give you any pause in your judgment, sir?

A It would give me something to think about. His sworn statement on oath -- mine's on oath, too, and two of us are on an opposite side, but we're both doing it in sincerity, and I'm not going to change my mind.

Q Well, you would think that he would know something about what his railroad could do, wouldn't you?

A Yes. Why don't he cure up to grain shortage, or grain car shortage, and why don't he cure up to car loadings in lumber so we can get the lumber out when it's ready to be shipped?

Q It's a big railroad. They have some vice president in charge of wheat, and some in charge of lumber, and some in charge of coal. He's in charge of coal.

A Maybe he ought to talk to the others.

Q Maybe we should both plan to come back when there's a hearing on the wheat, grain, and lumber problems on shipment by rail, too, but in this hearing --

A I don't think that'll be necessary unless you guys get involved.

Q You can make decisions yourself, Mr. Crosswhite?

A No, they've been making decisions here for a long time on lumber and grain.

Q And the railroads have too, haven't they?

A Yes.

Q And you don't like all those decisions?

A I didn't say that.

Q Now, you make a statement, sir, in your prepared testimony, that the movement of coal by slurry pipeline would use a tremendous amount of water. I suppose that usage is a relative thing. How does the comparison sit in your mind, between the use of water for slurry pipeline shipment of coal, and the use of water for mine mouth generation of power from coal that has come from a nearby source?

A I would rather see it used at mine mouth for a source there, because it would be producing a finished product in Montana and there would be employees working in the state of Montana. It would be work for Montana people, where on slurry pipeline, the water's shipped out. After the pipeline is completely constructed, there may be a pump man every three or four hundred miles along the line, and that's all there would be in employment for Montana people.

Q How many jobs would be created by a slurry pipeline shipment of coal from Colstrip, Montana, to Hot Springs, Montana?

A I am not an engineer, so I couldn't answer that. I would say it would be, maybe, five or six pump stations, and they're mostly remote control any more, so there'd be maybe two or three pump men along the line, and that's about the extent of it.

Q Have you investigated the movement of coal by slurry pipeline to see what it involves in terms of manpower?

A No, I wouldn't say I have, but I have seen other pipelines in operation, oil pipelines and so forth.

Q The question that I had asked you, Mr. Crosswhite, was on the subject of the comparison of the use of water. How much water is used in a mine mouth power plant, as compared to how much water is used in a coal slurry shipment?

A I couldn't tell you those, because I'm not an engineer. I'm a labor representative, not an engineer.

Q You made the statement, sir, that it would use tremendous amounts of water to move coal by slurry pipeline. I'm wondering if you are aware of the fact that a mine mouth power plant, per gallon of water per million BTU delivered, would use 100 gallons, and a coal slurry pipeline, 12 gallons? Did you know that?

A I didn't know what the comparison was, but that 100 gallons of water used in the generating plant would provide a lot of jobs, too, where the 12 gallons wouldn't provide any.

Q Well, you've testified as to what you know about the job provisions --

A That's what I'm interested in, sir, is the jobs.

Q I'm trying to find out why you made the statement about tremendous usage of water for a coal slurry pipeline if you don't know how much water is used in a mine mouth generating plant. Can you tell me that?

A No, I can't tell you exactly, or how many, or even close to it, but I can tell you that the water that goes in a slurry pipeline is a big amount, and it is pumped out of the state of Montana, never to return.

Q And it's 10% of the water that would be used in a mine mouth power plant?

A I don't know. My own personal opinion, I kind of doubt that.

Q Oh, do you?

A I do.

Q The Bechtel Corporation, with whom you have had some contact, also happens to be the primary contractor on the development of the movement of coal by slurry pipeline. They are a joint venture in a project called Energy Transportation Systems, Incorporated, and their publication, "Slurry Pipelines, Innovation and Energy Transportation," has been entered in the record of the United States Congress. It's their figures that I was just quoting to you, Mr. Crosswhite. Were you not aware of those figures from your contacts with Bechtel?

A No. I've never talked to Bechtel about a slurry pipeline.

Q Now, you also make the statement, in the long run, the land which would have to be reclaimed from strip-mining, may well be in better condition, better-suited for various agricultural uses than it was before coal mining took place. We all, of course, hope that that will be the case, by the obedience to Montana law with respect to reclamation. I'm wondering, sir, with whom you have had contact in order to verify your knowledge of reclamation practices?

A My contact has been at Colstrip, one of the mining camps which is Colstrip. I was there when the first coal was lifted by Long Construction Company, and I've been there very frequent times since then, and I've seen the reclamation job that's been going on in the last three or four years. That's where I get my information from, is being there and seeing this kind of thing.

Q Eyeballing?

A Yes, yes, and nobody has told me; I've seen it.

Q Okay.

A And I think it's going to improve as they experiment. There's a lot of experimenting to do. It's like anything else, they didn't put a man on the moon the first time they tried, but they finally got one up there.

HEARINGS EXAMINER: Well, we're not going to go into the aeronautical field.

MR. SHENKER: Well, the man obviously has some expertise on the subject, but we'll let it pass.

WITNESS: Well, I thought I'd get on that area before you did, just to be ahead of you.

MR. SHENKER: By gosh, you sure did it, Mr. Crosswhite. You got to the moon before I did.

Q You also state in your prepared testimony that Montana has been in a colonial status by shipping raw materials out of the state, and therefore, you'd like to correct that situation by generating power at Colstrip in order to use raw materials here at home; right?

A Yes.

Q I take it, what you like about the colonial status of Montana is that it can ship power out of Montana?

A I would rather see them ship power out than by slurry pipeline.

Q Or than by unit train?

A Or by railroad, yes.

Q Is it relevant to you, Mr. Crosswhite, whether the numbers of jobs which would be generated by the various alternative ways of getting power to the load centers, such as the Pacific Northwest, would be more or less, whether you used mine mouth, or some other alternative?

A I can't answer that, because there's too many if's connected. If they didn't have their mine mouth generation facilities, I doubt whether there'd be any coal shipped out of Montana. There's a lot of coal mining in British Columbia that's very much closer to Seattle and Spokane and the Inland Empire, and the Pacific coast. They could even buy it from Canada. They don't necessarily have to buy it from Wyoming or Montana. And there's a lot of if's. As far as the state of Montana colonial status, in this very chambers here about 15-18 years ago, and I can't recall the hearing, but a railroad man got up as a witness and said that they considered the state of Montana as a bridge for transporting goods from the west coast to the east coast, and vice versa. And that's the way it's always been here, and I don't think it's right. We need the jobs and we should have some industry here in this state, not ship everything out by pipeline, railroad, or anything else.

Q If the bridge generates more jobs than not being a bridge --

A It hasn't generated any jobs. That's why we're in the shape we are now; that's why Montana has been in the backwards stages as far as employment is concerned. We haven't had much construction.

Q Will you try to listen to my question, Mr. Crosswhite?

A I'm sorry.

Q Not fight the assumption. If the bridge, as you call it, quoting from a railroad man, generates more jobs than not being a bridge, is that relevant to you?

A Run that past me again, sir.

Q If the bridge, as you call it, quoting from the railroad man, generates more jobs than not being a bridge, is that relevant to you?

A Being a bridge didn't generate any jobs, just a few train crews.

Q I'm not asking you whether it did generate more jobs. That's the assumption I want you to make, Mr. Crosswhite. Now, having made that assumption, don't fight it. Don't tell me you can't make that assumption; make the assumption and then tell me whether it's relevant to you.

A I'm not going to make the assumption because I can't assume anything like that where shipping everything out would make jobs.

Q You're just unwilling to make the assumption that there could be jobs in greater number from some alternative to mine mouth generation; is that right?

A I don't think it's true.

Q You're unwilling to make the assumption, aren't you?

A Yes.

Q Now, you are the president of the Western Environmental Trade Association. Is that a Montana chapter of the Western Environmental Trade Association?

A It is, sir.

Q When did the Western Environmental Trade Association get founded?

A About a week ago.

Q In Montana?

A Yes. It's been very successful in Washington and has been in existence there. Probably you're familiar with it.

Q Do you know when it was founded nationally?

A No, I don't.

Q You know, do you not, Mr. Crosswhite, that the Western Environmental Trade Association is composed of groups who are in opposition to the so-called environmental groups? That's true, isn't it?

A That's one of the main -- I wouldn't say they're in opposition to environmental groups, but the object of WETA is to get some jobs going in sound construction projects, such as Colstrip 3 and 4.

Q Do you know of any hearing any place in the world where the Western Environmental Trade Association has appeared in concert with the environmental groups that have appeared?

A I couldn't tell you whether they were in concert with them or anti, because I am not that familiar with what they did in Washington. I know they've got a good record in Washington. That's what was recommended to us. We're going to operate in Montana to what we think will be good for Montana. We haven't even crawled yet, let alone walked, so I don't think there's much that I can say about it. I was elected president. I think it was an honor, and I'm going to try to do the best job I can. One of the things that they are in support of is

Colstrip 3 and 4, and it was unanimous.

Q How many folks were present to vote on that question?

A Do I have to answer that?

Q Yes.

A The steering committee --

Q How many?

A Oh, there was, maybe, thirty there.

Q Now, Mr. Crosswhite, when you refer to the good record of the association in Washington, you know, do you not, that the Western Environmental Trade Association in Washington is regarded as an anti-environmental group? You know that, don't you?

A By some people, it could be, yes. I imagine it would be.

MR. SHENKER: Nothing further. Thank you, Mr. Crosswhite.

HEARINGS EXAMINER: I think at this point now, I want to clarify something, since we're just starting on the public witnesses. If they come and testify orally or by written statement, then they're subject to cross-examination. What are the views of the counsel on both sides as far as redirect is concerned?

MR. SHENKER: Well, if they are parties, then redirect examination would be proper. If they are not parties, then they are not entitled to redirect examination, I should think.

HEARINGS EXAMINER: All right. I want to hear from both sides on this. We haven't reached that. We're just at the public stage and, of course -- Mr. Peterson?

MR. PETERSON: Well, it would be the applicants' position that, with regard to any public witness, in order to keep the record clear, that after cross-examination, the proponents or the opponents, regardless of where the public witness appeared, should be entitled to clarify any record by any questions they desire to ask. So, it would be our position that we could ask the proponents of the project who are public witnesses, questions on redirect, as well as the opponents to this application asking the public witnesses who oppose the application redirect questions, in order to keep the record clear. Certain things are said that I think would lend clarity to proceeding if additional questions were asked, because, as you know, Mr. Davis, one of the arts of cross-examination is just to get your point across and close off the witness, and I don't think that's the purpose of this proceeding.

HEARINGS EXAMINER: Mr. Shenker? We'll apply it both ways, and I assume you're both going to have public witnesses, or there will be public witnesses come in, maybe even some that neither side knows about in advance. So I just want to get your views before I make any ruling on it.

MR. SHENKER: Obviously Mr. Peterson's talking about strategic advantages. I didn't think that was the purpose of the proceeding. If the applicants are able to bring in legions of public witnesses, and the list is rather long at this time, then, I suppose, they would find some advantage on their side to redirect examination. I don't want to be in the position of trying to cultivate public witnesses to come in to testify so that strategic advantages can be obtained by any side in these proceedings. The theory of redirect examination is that it redirects the witness to the testimony which he originally prepared, with the assistance of the person who is redirecting the examination, and it's totally incompatible with that theory to have a non-party offer testimony, and then have a party redirect the testimony. There is no basis in which redirect examination makes any sense in that kind of a situation. I know that the general precedent that is followed in public proceedings, in administrative rule making, legislative type and judicial hearings, is that a public witness who tenders himself for cross-examination, is cross-examined and then leaves without redirect examination.

HEARINGS EXAMINER: Well, I'll make that -- I'm going to go along with that as far as this witness is concerned, subject to seeing how the hearing goes, and if there are any problems that present themselves, unless there's something critical -- however, I will permit the public witness to make any further statement in clarification at the end of his cross-examination, if he wants. Do you have anything further you want to say, Mr. Crosswhite, in relation to this, or any points that you feel were not clarified adequately?

WITNESS: Not at this time, no.

HEARINGS EXAMINER: Very well, you're excused, and we'll leave this in abeyance to see if we do run into some snags, and then we'll see how we work.

(WITNESS IS EXCUSED.)

HEARINGS EXAMINER: Mr. Hilley, do you have anything further? You may want to put something on the record in regard to this particular thing.

MR. HILLEY: Well, Mr. Davis, I'm going to move that the IBEW be served with copies of the opposition's statements. I remember the cross-examination of Mr. Williams and Mr. Polzin in a very holistic sense yesterday, and I'd like to add that, although the opponents have had the benefit of our statements in advance, and it was served upon them when it was due, we don't have any statements from the opponents.

HEARINGS EXAMINER: Well, I'm sure you can resolve that, can't you, Mr. Shenker?

MR. SHENKER: Sure. There's no problem at all, Mr. Davis. The Hearings Examiner previously has ruled that those parties who are present will receive the documents that are here to be tendered to them. Mr. Hilley has not been present at the time that the documents have been served, but I have no problem in providing copies of all of the papers previously served upon the people who were here, and Mr. Hilley who is now here.

MR. PETERSON: I'd like a clarification of that statement.

HEARINGS EXAMINER: I can clarify that myself. The service of written statements on the parties -- The rule about serving papers, I don't think applied to written statements; however, we'll see that you're served with written statements of the testimony, and we also required the applicants to serve copies of their written statements on the people that are present, or not present. I don't know, you probably weren't aware of that. We required them to serve copies of their statements on Mr. Graybill whether he's here or not, or Mr. Meloy whether he's here or not, on the written statements.

MR. SHENKER: By leaving them here in the hearing room.

HEARINGS EXAMINER: Not necessarily on the written statements. I don't know how you've effected service on each other, but would you be kind enough to see that he gets a copy of the written statement?

MR. SHENKER: By all means. I said I would, of course.

HEARINGS EXAMINER: I was sure of that. Very well. Can you call your next witness, Mr. Peterson?

MR. PETERSON: I have redirect for Mr. Zobel.

HEARINGS EXAMINER: That's right. Mr. Zobel, redirect. I intend to exercise some discretion on the public witnesses, because we've got, maybe we're going to have fifty or more of them, and if we go cross and redirect and re-cross, why we'll be here some time, so I'm not going to make a firm ruling. If it appears that there's some clarification, and I can understand on cross where a public witness can be at a considerable disadvantage, dependent on what takes place, so I'm going to leave that open on the thing.

MR. HILLEY: Mr. Davis, also the opponents, I presume, will be putting on their case very shortly. I would like to furthermore move that we know which order these witnesses are going to come; and secondly, if any witnesses are going to testify Monday, I think that I would also move to continue these witnesses until I have a chance to study the statements.

HEARINGS EXAMINER: What is our order? Let's clarify that for the record right now. What's the situation on Monday, Mr. Shenker? I think we discussed this, but I don't think necessarily on the record where everybody's clear on the thing. I've advised everyone I'm willing to work Monday if the parties can get together and do it whether it's a holiday or not.

MR. SHENKER: Well, if you'll recall, Mr. Davis, when we commenced the hearing this week, we announced our intention to be ready to proceed with our witnesses tomorrow, Thursday. Obviously, that wasn't going to happen.

HEARINGS EXAMINER: Well, it's quite obvious that that just wouldn't work.

MR. SHENKER: No, we haven't had enough witnesses to come in to finish up where we could have been.

HEARINGS EXAMINER: Well, we haven't had any time to finish up. As a matter of fact, with about two hours separated, they haven't got their case in, or the order of procedure was, the public witnesses would follow the proponents' case, and we have numerous of those, but we're willing to make some adjustments to expedite the thing and fill it up. Number one. Number two is, as far as the time factor of knowing what witnesses are concerned, I announced at the very outset, I'm going to extend to the applicants the same courtesy that's been extended the other side, to give them time to study the testimony. And their testimony was served the 10th day of January, and these other ones have just come in last week, so that's a problem, and I can see an argument if it were the other way, that would be effective for you to use, too.

MR. SHENKER: Well, the record should be clear, Mr. Davis. We received the statements of the applicants on the 14th of January, and their testimony began on the 19th of January. We served the testimony of the first witness on the 21st of January, and his testimony we now intend will commence on the 16th of February. All of the witnesses' statements for the first fifteen witnesses that we propose to call between now and the 19th of February have been served on the applicants in greater time before the commencement of that testimony than the testimony from the applicants' witnesses was received by us. The schedule for the witnesses was served yesterday upon those in attendance at the hearing at that time. I've just asked that an additional copy be served upon Mr. Hilley, who has it now, and we tendered that to the Hearings Examiner as well. Our witnesses had to be rescheduled in order to commence on Monday afternoon from the original schedule that we had intended to follow, and the rescheduled list of the witnesses has been served upon the parties in attendance at the hearing.

HEARINGS EXAMINER: How many do you have lined up for Monday?

MR. SHENKER: For Monday, we have three witnesses who would be available to testify. The first witness is the Lieutenant Governor of the State of Montana, The Honorable William Christianson, to commence at one P.M. The next witness is Mr. Arnold Cogan. The third witness would be Dr. Albert Tsao.

HEARINGS EXAMINER: Now, have the applicants -- when were those statements served, of the first three?

MR. SHENKER: Mr. Christianson's statement was served on the 21st of January; Mr. Cogan's statement was served, I think, on the 23rd of January, but I could stand to be corrected on that; Dr. Tsau's statement was served on the 4th of February.

HEARINGS EXAMINER: All right now, will the applicants be in a position to cross-examine those four witnesses on Monday?

MR. PETERSON: Those three?

HEARINGS EXAMINER: Those three.

MR. PETERSON: Yes.

HEARINGS EXAMINER: Mr. Hilley, I'm concerned, and we have this on both sides, so that's going to be one reason of my concern, is that I don't know whether you would be here or not. I don't want to continue a proceeding to another date for someone that's not going to be there when it occurs, and that could be a problem, and we have that on both sides. We have the applicants here all the time, and we have the DNR here all the time. If they're prepared to cross-examine and go forward, unless there's some real hitch, we would prefer to keep the thing moving, and I'm sure that's been the position of the parties here. What would be your situation on those three witnesses? Would you be going to cross-examine on all of them?

MR. HILLEY: Well, this is just my problem, Mr. Davis, not having seen the statements, for all I know I may agree with what they say entirely, or I may disagree, but having not seen the statements, I don't know whether it's necessary for me to be here or not, because I don't really, honestly know what they're going to testify to.

HEARINGS EXAMINER: Well, if they get you a copy of the statements today, we'll go ahead Monday because we'll take up that much time with the other cross-examination, and then if we run into a snag that's going to have some prejudice to you, then we can have -- a couple of them can be recalled, I assume, since two of them are local. Who's Mr. Cogan?

MR. SHENKER: He's not local. He's from Portland.

HEARINGS EXAMINER: Well, at least two of the three, I guess, if we ran into a real problem, then, after Monday, but I'd rather go ahead and try to get this thing to some conclusion, and some of your witnesses yesterday testified something about the attorneys' holding it up, and so I'm not going to be a party to that. So, we'll go ahead and go Monday at 1:00, and then if you run into a real snag on cross-examination, we'll work something out.

MR. PETERSON: I would hope that you would have those remarks typed up and presented to Mr. Graybill. Also, Mr. Davis, as you know, we have a number of public witnesses who have written in to testify in this proceeding. Those public witnesses, I assume now, will be crowded out of this schedule in light of the new ruling by the Hearings Examiner that we're to proceed Monday at 1:00 with the cross-examination of the DNR witnesses. I think you better write those public witnesses and tell them not to come Monday, Tuesday, Wednesday, Thursday, Friday, or whenever, because it appears to me that they shouldn't be cooling their heels in this chamber in view of the fact that we had led them to believe, and I believe you had also in letters to them, that the public witnesses who supported the application would follow our case-in-chief.

HEARINGS EXAMINER: Right. All right, I'm not going to make such a ruling. I'm not going to write them. I've written them to come in on Tuesday. After a week ago we adjourned, I told everyone here I'd write, and everybody thought that was an excellent idea, but there've been some changes since then, so what we're going to do is, when the public witnesses come, they're going to be taken, in order; when the witness that's on the stand is through, then I want to take any public witnesses that are here, until we get through with the proponents' public witnesses. I don't want to adjourn the entire case until all the proponents' public witnesses can get here, because some of them have indicated they can't be here until the 17th or the 19th, and even as late as the 23rd. Did you get that all right?

MR. SHENKER: That was our understanding.

MR. PETERSON: Well, it doesn't make any difference.

HEARINGS EXAMINER: Well, it makes a lot of difference, whether you understand, because I don't want your side writing and telling them not to come, because we're going to take them just as I indicated. When they come, we're going to take their testimony that day. We're not going to interrupt the testimony of the witness on the stand. At the conclusion of who's on the stand, we'll take whatever public witnesses are present, until the proponents are over with. Does that sound all right to you? And, I've advised them to come, and I've been notified by some that they could come the 17th, some the 19th, and one as late as the 23rd, the ones that have written me. By the end of this week, I understand, we should be through a lot of the public witnesses and we'll know better where we are.

MR. PETERSON: I hope so.

MR. SHENKER: I think we should put on the record that the statement the Hearings Examiner just made was the understanding that, at least, we had as to how we were supposed to proceed. Public witnesses, I understood, were to be given accommodation, and to be allowed to interrupt in the otherwise orderly process of the placing of witnesses on behalf of the parties on the stand for cross-examination. And that would mean the public witnesses could interrupt any of the parties' cases if that was the schedule which they were following. Moreover, that was an understanding which I had confirmed in the week in which we were in recess from these hearings by contact with the applicants' counsel and the Hearings Examiner.

HEARINGS EXAMINER: That's right. And the only public witness we've had prior to this time was in the middle of the case last summer, and we took him right when he was here and put him on, so that's what we'll continue to do. We'll accommodate the public witnesses when they arrive. They're going to get first priority.

MR. HILLEY: I have one more question. Now that I've received this Department of Natural Resources' witness list, for example, when does the opposition intend to put Mr. Fred Barrett on the stand?

HEARINGS EXAMINER: You could share that list, maybe, and you could see. How far down the list is he?

MR. SHENKER: He's the twelfth witness. I would guess not before the 18th, maybe the 19th. We've told him to be available on the 18th, but it would depend how fast the applicants cross-examine the first eleven witnesses. I anticipate that the first six witnesses wil conclude their testimony by Tuesday the 17th. That would mean we'd have to get five more witnesses on before Mr. Barrett could testify thereafter.

HEARINGS EXAMINER: Now, Mr. Hilley, it'd be my view that if there's a specific witness that you are prepared to testify to represent your clients, we'll make every effort in our scheduling to accommodate you, and I'm sure the parties will, because we've done that throughout. We've done that when the various parties have had conflicts. They've done a little shifting of witnesses until they could be here to cross-examine, and I trust that we can still do that throughout the remainder of this, can't we?

MR. SHENKER: I hope so.

HEARINGS EXAMINER: There's been a time or two, I remember, when someone from your firm hasn't been here and we've rescheduled, and for Mr. Graybill, and so forth, and we would like to do that. So, if we can find out in advance of when he will testify, or even if it's out of order on a certain day, maybe we can notify you and Mr. Shenker can notify me, or however.

MR. HILLEY: Just a question here. When am I supposed to receive these statements?

HEARINGS EXAMINER: Well, they'll get them to you this morning, I suppose. Linda -- does she have them, Arden, or does Don?

MR. MacINTYRE: The ones we have here, we'll serve them now.

HEARINGS EXAMINER: Okay. You want to make a record of the ones you're serving them, as long as we're on the record right now. You might as well just put it on there what you're serving them.

MR. MacINTYRE: All right. For the record, the Department of Natural Resources is now serving the statement of James A. Posewitz, Arnold Cogan, Timothy Devitt, Fred Barrett, William A. Brewer, Dr. Kanu Shah, Ibrahim Hindawi, Gary Wickes, Mr. O'Scannlain, Dr. Morris, John Szablya, Raymond L. Gold, and Bill Christianson. Service is being made on the IBEW.

HEARINGS EXAMINER: And, I think they should get exhibits, if you have them, that go with those. Are there any exhibits that go with those statements?

MR. SHENKER: I think they're all attached.

HEARINGS EXAMINER: Attached to the statements. Thank you. All right, are we ready to proceed, gentlemen?

MR. SHENKER: Before Mr. Hilley leaves, I'd invite him to take a look at those statements. If there are any exhibits that are not attached, through inadvertence in the copying process, we'd be happy to supply them promptly. I'd also like to say that if Mr. Hilley wants to implement procedures, as Mr. Davis indicated as the Hearings Examiner, of telling us which witnesses he would like to cross-examine by direct communication, we'd be more than happy to accommodate him. That's the way in which it's been done with the other parties through counsel.

MR. HILLEY: For the record, certainly I want to see what the witnesses are going to be testifying about. The IBEW, of course, has more or less confined itself to the employment/unemployment picture in the state. I think that whatever cross-examination that we would be given, would be directed primarily in that area. This is a reason why I don't think it's necessary for us to be here all the time, but when we do hit witnesses that are going to testify on the employment picture, I think that this is where the crux or thrust of the whole thing will be.

HEARINGS EXAMINER: I understand that, Mr. Hilley, and that's the reason for my ruling. Various of the parties have certain areas of expertise, or their interest, but we want to proceed with the overall thing if we can work out those items. Okay.

MR. HILLEY: Thank you.

HEARINGS EXAMINER: We'll help you in any way we can so we can get this over with. All right, let the record show that Mr. Zobel is back on the witness stand for redirect examination.

EUGENE S. ZOBEL, previously called as a witness by the applicants and previously sworn upon his oath, resumed the stand for the continuation of his examination and testimony.

CONTINUATION OF EXAMINATION OF EUGENE S. ZOBEL

Redirect, by Applicants,

By Mr. Peterson:

Q Mr. Zobel, during your cross-examination yesterday by Mr. Graybill, you were discussing that part of your statement on page 5 dealing with lines 11 through 13, in which you have made a statement relative to the use of the so-called guide Y-type tower which is represented in Applicants' Exhibit number 70, and in your statement you stated that that type tower would be used on the line proposed unless the owner insists on another type of structure known as the self-supporting structure. What is the policy that will be implemented regarding the construction of the line from Broadview west to Hot Springs?

A We would propose that the property owners would be shown the types of construction planned, and we would propose using as many guide structures as possible, and if there should be any objection by the property owner for use of guide structures, this would be taken into consideration.

Q Now with regard to the examination as to your conclusions that the conceptual design of the line would be such that it would withstand two inches of radial ice with no wind, or 120 mile per hour wind on bare wire, do you consider that design to be adequate?

A There are other factors in the design of these structures, very important factors. We indicated -- I indicated yesterday that there were probably two additional criteria of wind and ice combinations. I couldn't recall at the time what they were, and I have since found out the exact figures and we are designing for a one and a quarter inch radial ice with a 40 mile per hour wind, and another combination of one inch of radial ice with a 60 mile an hour wind.

Q Do you know of any line, transmission line, presently in existence in Montana that has an identical design criteria?

A I believe that this is designed much more heavily loaded with ice and wind than any design in the state of Montana, and probably neighboring states, with possible exceptions of a few instances in neighboring states where they may have beefed up in mountain ridges.

Q Now, with regard to the meteorological study that you ordered from MRI, which is the report marked Exhibit 87, you testified and, I believe, the report itself so states, that another year of data would be desirable in order to evaluate whether the conceptual design which you have made is adequate in all respects?

A Yes.

Q Will it be possible under the present schedule of construction to get another year of winter data?

A We believe that under the present schedule, we should be able to get, I believe, two winters' experience with these mobile weather stations. We will definitely go ahead with the plans on whatever corridor we are finally authorized to proceed on, and if it's the same corridor we have recommended, we will try to get these additional weather stations installed and get this information. Understand, this is a corridor we're talking about, and if, by chance, we find that MRI recommends that this particular location should be changed, we probably can change, in some instances, within that corridor even.

Q What is the width of the proposed corridor?

A The width, I think, is two and a half miles.

Q And what you're saying then, is that the centerline, which has yet to be finally selected, can be moved within that two and a half mile corridor?

A We would expect that, yes, for whatever reasons we find it necessary.

Q Would that take into consideration, of course, weather conditions?

A Yes.

Q Now relative to the fact that in Exhibit 87, and in the study made by MRI, there was no specific site selection east of the Broadview area. Why was that?

A I'm sorry, would you repeat that, please?

Q With regard to the MRI study, it is stated in Exhibit 87, in one of the tables, that there has been no specific site implemented or studies, according to that table, east of the Broadview area?

A I understand now.

Q Why was that?

A The reason is that there are no terrain features east of Broadview which would create any concern according to MRI. To the west of Broadview there are many terrain features. The need for establishing prevailing wind directions, or the wind directions of highest velocity, and location of bodies of water, elevations, all of these things are factors which need to be evaluated in some local situations. Such terrain features just didn't present themselves to the east of Broadview.

Q Well, do you feel that you have enough weather data for design purposes for the line east of Broadview?

A Yes.

Q Why?

A Because this was given to us in the initial reports from MRI on both the fifty year return period and twenty five year return period, and we consider that adequate.

Q Is that customary in the business?

A As a matter of fact, what we are doing here is rather new. The design of lines in the past has been without the benefit of experts such MRI, and we've done pretty well in designing lines and selecting winds and ice without this, but we felt in this important line, it was desirable to get this expertise.

Q Also in your cross-examination by Mr. Graybill, he mentioned about a Bureau of Reclamation line east of the Broadview area near Colstrip, he called it, which suffered some heavy ice loading and, I believe, a number of towers went down; is that correct?

A That's right.

Q What do you know about that Bureau of Reclamation line?

A That line was built roughly, at that time, it was about 23 years before, and it had had no difficulties over the first 23 years. Then this ice storm struck and the wires broke. The ice accumulation was severe enough to actually break the wires.

Q Is the Colstrip design similar to the Bureau of Reclamation design?

A It's designed for heavier wind and ice loads.

Q Which is?

A The two inches of radial ice which we're designing for.

Q For Colstrip?

A Yes. And 120 mile per hour winds with no ice. This, in itself, I believe, exceeds the Bureau of Reclamation design requirements.

Q And also in the discussion with Mr. Graybill there was conversation relative to the failure of a line in Wisconsin which, I believe, you also noted in your direct testimony?

A Yes.

Q What was the reason for the line failure?

A I, of course, did not get involved in the complete examination of this, but it's a well known fact that these designs are quite different from anything we're talking about here in Montana. I indicated in my testimony that there were wind and ice involved during that line failure of about 70 miles of tower line, steel tower line collapsing. But, these structures were not designed for any significant longitudinal strength, and therefore, with the loss of a structure, why, this created what is called either a domino or cascading effect.

Q What do you mean by designed for longitudinal strength?

A This is providing strength in the structures in the direction of the conductors. Parallel to the conductors. This is called longitudinal, and we have provided for this in the Colstrip project designs and we have indicated sufficient strength for ice dropping as well as providing for containing the damage if we were to lose a structure for any reason.

Q Well, in Exhibit 87, which is the MRI study, on the map it is shown that one of the sites selected was west of Missoula between Missoula and Hot Springs, near the Moiese area. Are you familiar with that site selection?

A Yes.

Q And Mr. Graybill made note of the point that during the time of the weather testing for that station, there was a thirty day breakdown in the measurements.

A Yes.

Q Is there any other data available in that area relative to design of towers and lines for transmission purposes?

A Yes, we have about a ten year record on an existing line, which we plan to parallel in this area, and the site is in the vicinity of this existing line, the site where we had missed one month record, so we do have a good record of performance on this existing line over a ten year period.

Q Is that line designed as well, or for as difficult a weather conditions as the Colstrip line?

A No.

Q Now with regard to one comment that you made yesterday in your cross-examination by Mr. Shenker, I believe you answered that you know of no vehicle or motorized implement which exceeds the height of 41 feet. In what context did you give that answer?

A I was thinking of conventional vehicles traveling down highways, or cross-country vehicles that might be expected under a line. I realize now that there are such things as construction equipment with booms and so forth, which if not properly operated, with the boom down, could create a problem.

Q Mr. Zobel, in one of the reports, technical reports which have been filed with your testimony, I believe there is a statement made of an air gap clearance. What is an air gap clearance?

A This is what we call the air breakdown distance where the air which is an insulator finally, at high enough voltage over a certain distance, will break down and flash over.

Q And how does that apply to the design of the Colstrip line?

A Well, within the structure, we have specified for this voltage line that we require 11 foot 6 inch air gap distance within the structure. Now this applies whether it's within the structure, or whatever. We need 11 foot 6 inch air gap to any grounded structure to prevent flashover during a switching surge.

Q How high, then, would a vehicle, or an implement, have to be in order to violate the air gap clearance?

A Well, with the clearances we have above ground, at the closest point, you could have a 25 foot high vehicle crossing under the line without difficulty.

Q Now, with regard to testimony given by you on cross-examination of Mr. Graybill, and also by Mr. Shenker, with regard to the studies by the Russians on the effects of high voltage line on workers, first of all I'll ask you, how did you become associated with that Russian study?

A Well, the State Department arranged for several groups on electric power to participate in a technical exchange. There were several committees and I was selected to be one of the members of the U.S. committee on transmission lines, terminal equipment, and anything which related to controls on transmission lines.

Q And when did you undertake that assignment?

A I don't recall the exact date, but it goes back several years, and our first trip to Russia was for this committee to meet with them and select topics which we wanted to discuss.

Q Was one of the topics which you have discussed with the Russians, their reports as to the alleged effects on workers of these high voltage lines?

A Yes.

Q What were the circumstances under which that study was prepared?

A Well, at the first meeting in Russia, we insisted that this be a topic of discussion, so the format of this arrangement was that both sides aired technical papers on the subject. There was an exchange of these technical papers, translations, and then we had a symposium in Washington where these papers were not presented as such, but simply questions and answers. This was the format of this, and it was a very good exchange of information between American and Russian engineers on this subject.

Q And what have you learned from those discussions and symposiums with regard to the Russian study?

A Well, the Russians had indicated to us that they, in their 1972 secret paper, which had created quite a bit of controversy and concerned our engineers that we could not substantiate their findings with research done in this country. We questioned them at length on these matters, and it developed that the nature of the studies done within substations was not just workers walking around the substation yards, but workers unprotected working very close to the energized busses, and so forth, over long periods of time. In our questioning with the Russians, we found out that they have electric field strengths under their transmission lines, 500 KV for instance, of about 14 KV per meter, where designs in this country are more in the order of 8 KV per meter. And they have indicated absolutely no problems with 14 KV per meter under their 150,000 kilometer miles of experience at 500 KV.

Q Were any of the members of the general Russian public involved in these studies?

A I don't believe so.

Q Would you anticipate that there would be any adverse effect to members of the general public in Montana by reason of the construction of the Colstrip line, from what you've learned from the Russians in their symposiums?

A You mean actual experience with ill effects, and so forth?

Q Yes.

A No.

Q Now, also under your examination by Mr. Graybill, he went into a discussion with you regarding an experiment, or testing, that you undertook with fluorescent tubes to indicate the electric field strength under 500 KV transmission lines. First of all, there were a number of questions as to whether or not similar tests were done by another individual, and Mr. Graybill made specific inquiry of you as to whether or not you knew what the voltage was at the time that you took the tests, and so forth. I will ask you, first of all, is voltage essential for the purpose of your testing?

A Yes, but the variations mentioned by Mr. Graybill would not have been significant with the kind of rough testing we were doing. We were not using instruments, we were using fluorescent tubes, simply to indicate the presence of some kind of voltage. The things that were important to us in this fluorescent tube test was, we wanted to find out the actual onset, as we call it, the beginning of glow of these tubes, and we found out that, in actual fact, that, based on knowledge of the electric field distribution underneath 500 KV line, that in walking away from the line and then back towards the line, that we actually had these tubes begin to glow at approximately one-half to one KV per meter, and we discovered the reason for this is that when you hold the tube in your hand, you are effectively grounding the tube, and so the onset of glow takes place at approximately one KV per meter, whereas the indications earlier were that it would begin to glow at six KV per meter. The six KV per meter takes place when the tube is ungrounded.

Q What effect does that have upon electric field -- or, what did you learn from that relative to electric field strength? If anything?

A Simply that the glowing of a fluorescent tube is not a sign of danger, which was the implication by Louise Young in the articles published by her.

Q Now I'm handing you what has been marked as Applicants' Exhibit number 82, and I'll ask you, Mr. Zobel, if that is not the report that you made on the tests with fluorescent tubes to indicate the electric field strength under a 500 KV line?

MR. SHENKER: In other words, you're offering an exhibit?

MR. PETERSON: No, Arden, I wanted to correct the record, too, that the Applicants' 82 which I had given to you was not included in any of the statements because we had, for most purposes, included that in the written testimony of Mr. Ender. So, this is not, as such, an exhibit.

MR. SHENKER: This is a substitute 82 then?

MR. PETERSON: And so I'm giving you a substitute

82, a copy of which you examined in the C.T. Main Portland office in, so long ago, March of last year, relative to this study. With that, Mr. Davis, we'd also offer Applicants' Exhibit 82.

HEARINGS EXAMINER: Do you want to look at it, or voir dire, Mr. -- is this a substitute for an exhibit you offered yesterday, or one you were going to offer subsequently?

MR. PETERSON: We did not offer, and have not offered, an Exhibit 82.

HEARINGS EXAMINER: This will just be straight 82 then?

MR. PETERSON: That's right, sir.

HEARINGS EXAMINER: Okay.

MR. PETERSON: And I'll have to get some more copies of this. This is the only one I do have.

HEARINGS EXAMINER: Well, we can put it in our original file after we receive it in, where everybody can use it if they need it at this time. Very well, without objection, Applicants' Exhibit 82 is admitted.

Q One other matter, then, Mr. Zobel. With regard to an inquiry made to you of a letter of February 26, 1975 addressed to Mr. Chet Tayor in your Portland office, from John Evans, in which he advised Mr. Taylor that Mr. Graybill, as the attorney for Northern Plains Resource Council, was not to receive any maps, drawings, or letters or other information from your field office in Billings. Did you understand that the purpose of that letter was that, at that time, Mr. Graybill was, in fact, representing land owners who were in condemnation proceedings by the Montana Power Company on the 230 KV line, and that was the purpose for which that letter was written?

A Yes, I understand that now.

MR. PETERSON: That's all I have.

HEARINGS EXAMINER: Mr. Shenker?

Re-Cross, by Department of Natural Resources and Conservation,
By Mr. Shenker:

Q As I've been thinking about it since yesterday, Mr. Zobel, I don't think you were there when we took Chet Taylor's deposition. I think you had to catch a plane and left before we deposed, since he was staying on.

A I checked that and I found out I was not.

Q Right. But it was kind of interesting when Mr. Taylor's deposition was taken. The letter that you just referred to in which he was instructed not to give any information to Mr. Graybill was delivered to Mr. Taylor, and then he was introduced to Mr. Graybill, who was about to take his deposition, so that made everything friendly at the very beginning. Let me ask just a few questions on the redirect that Mr. Peterson has put to you this morning, sir. First, in the design of the lines with respect to the radial ice and the wind, I think you told Mr. Peterson that there are no similar designs on lines in Montana now. Are there any 500 KV lines in Montana now?

A No. Correction: Yes.

Q Where?

A The Bonneville Power has a 500 KV line coming into Hot Springs.

Q What is the design for radial ice and wind there?

A I don't know.

Q Now, as I understand your testimony with respect to the desirability, if not necessity, for obtaining additional weather data, as you see it, if a certificate is issued by the Board of Natural Resources authorizing the construction of the Colstrip units 3 and 4 and two 500 KV lines along the corridor that you have proposed, you would then have time and would advise that MRI do additional studies, weather data would be obtained, and if, as a result of that additional data, it was necessary to make any modifications in design, you'd do that; right?

A At the sites within a local situation is all we're talking about.

Q And you're talking about if the same corridor is the one that you're following?

A Right.

Q And really the picture that you have in mind, Mr. Zobel, is it not, is that the decisions on the modification of that corridor, are decisions which you responsibly, and consistent with good engineering practices, would make, at least as recommendations to your client, the Colstrip project management, and that's a decision that should take place some time after you're authorized to build the line; right?

A Yes.

Q You wouldn't want the Board of Natural Resources to have all that information from additional weather data before they make their authority to you?

A Let me think about that. I'm not quite sure I follow this. Until we're authorized to go ahead with the line, I can't imagine that we'd be testing with these mobile weather stations.

Q Or at least testing any more than you have already?

A Right.

Q Okay. Now, Mr. Peterson was asking you about towers that have fallen down in various places. What was the wind and ice load design on the Bureau of Reclamation towers that fell down near Broadview?

A I don't recall the exact figures. I'm only aware of the fact that they were less than we're designing for.

Q How much? You don't know?

A I don't know without comparing the figures precisely. At the time I secured the information, we made a comparison.

Q What was the amount of ice that accumulated on those conductors?

A I don't recall precisely. It was in the order of four inches of radial rime ice, I believe some snow combinations. It was a lesser density than we are talking about for design.

Q Of course you know that there has been a measured accumulation of as much as six inches of radial ice in places in Montana?

A I believe that's correct.

Q What was the wind speed to which those towers were subjected before they fell down?

A I don't know.

Q Do you know what the combination of radial ice and wind speed was to which those towers were subjected before they fell down?

A I think I have some information on that, again, in the collection of information from the Bureau of Reclamation, concerning that failure. I believe they indicated some light wind. I just don't recall the figure, but it was a broken conductor that precipitated the failure of the towers. In other words, the wire simply couldn't support the ice.

Q Is that something that should have been found on routine maintenance?

A No way. It was simply an icing in excess for which they designed. We have designed a higher strength conductor, and designed for two inch radial glaze ice or clear ice, which we believe will give the Colstrip towers a good record.

Q Unless the radial ice is more than two inches or the wind blows at more than 40 miles an hour when the radial ice is more than one and one quarter inches?

A That is correct.

Q You testified to Mr. Peterson that the result of the air gap and other clearance provisions that are being made, is that a 25 foot vehicle would be able to clear the wires without difficulty. Would a 26 foot vehicle be able to clear the wires?

A It isn't a question of the vehicle clearing the wires, and -- clarification: You said Mr. Peterson testified, I think.

Q Oh, my goodness, I shouldn't have said a thing like that. True or not, I shouldn't have said a thing like that.

A That's just for the record. However, it's important to recognize that we talked about the air gap, and this is the air gap which we feel is the breakdown during switching surges. And so the probability of a vehicle 25 feet tall passing at the closest, or lowest, point of the conductor, precisely at the time that a switching surge would occur, is quite remote, but we don't take that into consideration. We think that we have provided for a 25 foot vehicle that could pass underneath there, and a switching surge could occur at that moment with no difficulty. You talk about a 26 foot vehicle, I think it could equally well pass under that. This 11 foot 6 inch air gap is a peculiar phenomena. It may or may not, due to convection currents, not strike downward. The tendency is more to go upwards. But still, that's the figure we use.

Q Well, if the convection currents don't play your way, and they go downward, indeed, then I'm trying to find out when you'd have difficulty. You've told us a 25 foot vehicle is without difficulty. Now are you telling us a 26 foot vehicle is equally without difficulty?

A We're talking about a difference between 11 foot 6 and a 37 foot ground clearance reduction. I've already got a half a foot in there. Now you're asking me if another 6 inches makes any difference?

Q That's what I'm asking.

A I'm saying that's pretty ridiculous to think that precise a situation would make a difference. We, perhaps, have a cushion, let's say, in our air gap flashover distance. I couldn't tell you how much, but I think an electrical engineer might support me in that.

Q Well, you see, it's not ridiculous at all, Mr. Zobel, to a 26 foot vehicle, to ask that question. That's why, I suppose, on highway overpasses, they say, clearance 26 feet 2 inches, or 16 feet 4 inches, or whatever they say, because if you're a vehicle at 16 foot 5 inches at a 16-4 inch clearance, it's not much of a difference, but it's enough to keep you from going under. So that's why I'm trying to find out. Can you tell me?

A Well, let me answer it this way. You could probably have a vehicle that is 30 feet pass underneath that as long as there's no switching surge at that precise moment.

Q And if there is a switching surge?

A There'd be difficulty with that 30 foot vehicle.

Q And with a 25 foot 6 inch vehicle, at the moment of a switching surge, there would also be difficulty?

A I doubt it.

Q A 26 foot vehicle?

A Because we're now at that fringe area.

Q How about a 26 foot vehicle?

A I don't think there'd be difficulty.

Q 27?

A Maybe.

Q Let's go back to the tower failures we were talking about a moment ago, Mr. Zobel. The figures that the Bureau of Reclamation put together for you actually showed that with one half inch radial ice at 56 miles per hour, there was a failure on one tower. With one and one half inch radial rime at 40 miles per hour, there was a failure. With no ice and 100 miles per hour, there was a failure. Right?

A I don't remember that.

Q I'm showing you the letter than John Evans sent to Einar Greve, with a copy sent to you, on August 6, 1973, where the Bureau of Reclamation had supplied the figures to Mr.Evans, and the figures are as I just read them to you; are they not? (WITNESS EXAMINES DOCUMENT.)

A Yes, that's correct.

MR. SHENKER: What's our next exhibit number, Mr. Davis?

HEARINGS EXAMINER: 27.

MR. SHENKER: We'll offer Exhibit number 27.

MR. PETERSON: No objection.

HEARINGS EXAMINER: Very well. DNR Exhibit 27 is admitted.

Q Back on the subject of the Russians, Mr. Zobel. The Russians' studies included the finding that, if you have anywhere from a 50 to a 1,000 KV line, the maximum exposure time under that line is three hours, based upon the medical studies that the Russian doctors had done, in order to avoid physiological, psychological, and sexual effects on the humans. That was one of their findings, wasn't it?

A I believe I recall something of that sort in the secret paper of 1972.

Q All right. Let's talk about the electrical field a little bit. As I understand it, you're proposing an electrical field of somewhere around 7 1/2 KV per meter; is that right?

A I think that's close.

Q Are you familiar with Drs. Baker and Marino of Syracuse University?

A No.

Q Did you not know Dr. Baker's recommendation based upon his studies, that the electrical field should be .15 KV per meter, as opposed to 7.5 KV per meter; were you not aware of that?

A No, and I think this is a subject that Mr. Ender can help you with.

Q Okay. Can you tell us, though, Mr. Zobel, if you had to provide an electrical field of .15 KV per meter, how much right of way would you need in order to achieve that?

A I don't think the right of way width is pertinent in that sense. Again, I think you should refer these questions to Mr. Ender.

Q I'm just asking you about them because Mr. Peterson had asked you about the electrical field questions.

A I also think that it's pertinent that, if he's looking for field strength like this, why we've been endangered by an awful lot of lines around the country.

Q Well, let's talk about some danger that is known. You know Dr. Kruger from the New York Academy of Science, do you not?

A No, sir.

Q Are you not familiar with his study upon the effect of electrical field in the productivity of fowl?

A No.

Q You were not aware of his conclusion that chickens exposed to an electrical field of 1.4 KV per meter were interfered with in their production?

A I'm not aware of any of that.

Q Mr. Zobel, are you familiar with the document prepared for the Westinghouse Electric Corporation, Environmental Systems Department, by Consad Research Corporation, entitled, A Cost Benefit Analysis Proposal on the Colstrip to Hot Springs Transmission Line?

A I don't think I'm familiar with that.

Q Let me show it to you.

(WITNESS REVIEWS DOCUMENT.)

A I don't believe I've seen this before. There may have been some of this information incorporated in the final Westinghouse report. I don't remember that document.

MR. SHENKER: Okay. I have nothing further at this time. Thank you, Mr. Zobel.

HEARINGS EXAMINER: Mr. Peterson:

Re-redirect, by Applicants,

By Mr. Peterson:

Q Mr. Zobel, with regard to DNR Exhibit number 27, which is the Yellowtail-Custer 230 KV line design criteria for loading conditions. After examining those specifications, can you state whether or not your design, your conceptual design for the Colstrip line, is more stringent than those design criteria?

A I'd like to study this for a moment.

Q All right.

(PAUSE FOR WITNESS TO STUDY DOCUMENT.)

A I would say there are some instances where our loadings exceed this, and there may be one instance here where it's the same.

MR. PETERSON: Very good. That's all.

HEARINGS EXAMINER: Mr. Shenker?

MR. SHENKER: Nothing further. Thank you.

HEARINGS EXAMINER: Very well, you're excused.

(WITNESS IS EXCUSED.)

HEARINGS EXAMINER: We'll take a ten minute recess while we change witnesses.

(RECESSED AT 10:45 A.M.)

Following a brief recess, the hearing reconvened at 11:10 A.M. on February 11, 1976.

ROBERT C. ENDER, called as a witness by the Applicants, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

(THE WRITTEN DIRECT TESTIMONY OF MR. ROBERT C. ENDER WAS DIRECTED TO BE INSERTED AT THIS POINT.)

TESTIMONY OF ROBERT C. ENDER

My name is Robert C. Ender. I graduated from Union College with a Bachelor of Science Degree in Electrical Engineering and from the University of Maryland with a Master of Science Degree. I have 25 years of experience which includes the development of electric utility system planning methods, the conduct of studies of utility system capacity requirements to meet future loads, the application of analytical and numerical techniques to power system design problems, and the administration of system planning and design activities.

I am a Registered Professional Engineer in New York and Pennsylvania and a Senior Member of the Institute of Electrical and Electronics Engineers and a Member of CIGRE, the Association for Computing Machinery, and the National Society of Professional Engineers.

I am Manager of System Planning and Analysis of Chas. T. Main, Inc. Prior to joining MAIN, I was associated with the General Electric Company and the McGraw-Edison Company. At General Electric I was on the staff of the Electric Utility Engineering Operation where I participated in the development of computer programs and techniques for system planning and protection. My responsibilities in this work included the development of analytical methods, the supervision of programmers, extensive documentation work, presentations to industry and customer groups and the application of the programs to utility systems.

At McGraw-Edison I was Manager, Distribution Systems Engineering. In this capacity I had both technical and administrative responsibilities related to the establishment of a new component. Specific projects included development of computer programs for underground system planning, cable impedance, and fault calculation; economic justification for additional analog and digital computing facilities and the analysis of the system aspects of problems related to the application of transformers and switchgear at voltage levels ranging from 15 kV to 500 kV.

I joined Chas. T. Main, Inc., in October of 1972 and have conducted or supervised planning and design studies for 150,400,500 and 765 kV transmission projects. Specific studies have included shunt compensation studies, short circuit studies, switching surge overvoltage studies, shield wire insulation studies, load rejection studies, conductor selection studies, studies of induced effects on adjacent circuits, transposition studies, electrostatic and electromagnetic effects studies, and insulation performance studies. In conjunction with the certification hearings for a 765 kV transmission project I participated extensively in the preparation of environmental compatibility material for the certification application and subsequent hearing testimony. In November, 1975, I testified on the electromagnetic effects of 765 kV transmission lines in hearings conducted by the New York State Public Service Commission.

I have published 21 technical papers and one book related to the planning and design of utility systems. Among these are

"Progress in Total System Planning," Proceedings of the American Power Conference, Vol. 25, 1963, co-authored with C.D. Galloway; and "Electric Energy from Interconnected Systems," Proceedings of the Engineering Conference of the Technical Association of the Pulp and Paper Industry, October, 1973, co-authored with E. Vennard and J.M. Perkins.

In addition to its other work on the Colstrip transmission project, Chas T. Main, Inc., was assigned the responsibility for the conduct of system planning and electrical design studies for the project. While the majority of these studies have been completed, others are incomplete and work will resume after certification of the lines. The following material outlines these studies and gives reference to exhibits for those studies whose results have been formally documented.

I. SYSTEM PLANNING STUDIES

A. Load Flow and Stability:

Extensive load flow and transient stability computer studies were conducted to insure the ability of the developing system to carry the load, control voltage, and operate in synchronism under both normal and emergency conditions. These studies included analysis of:

1. The 1975/76 230 kV system to review the system performance indicated by previous Montana Power Company studies.
2. The 1978/79 system under heavy winter load conditions.
3. The 1979 system under light summer loading conditions to investigate voltage control and the effect of heavy 500 kV system transfers.
4. The 1979/80 system under heavy winter load conditions to investigate effects of various levels

of series compensation, to size the 230/500 kV autotransformers, to size the shunt reactors, to determine the effect of dynamic braking resistors, to investigate the need for voltage support at Helena, to study neutral grounding resistors for the generator step-up transformers, and to determine critical switching times and an out-of-step switching procedure.

5. The 1990 and 2010 systems to demonstrate the comparative adequacy of several transmission expansion plans.

The following reports document the results of some of this work: "Report on Transitional Stages of Development - Colstrip 500 kV Transmission Project", March, 1975, Chas. T. Main, Inc., Applicants' Exhibit 91A; "Montana Power Company Transmission Requirements, 1990-2010 System", June, 1974, Chas T. Main, Inc., Applicants Exhibit 91B.

B. Short Circuit Studies:

A variety of computer studies of the system under short circuit (fault) conditions were conducted for the 1976, 1979, 1980 systems for both maximum and minimum generation conditions. The result of the 1976 portion of this work is included in Applicants' Exhibit 91C: "Colstrip 500 kV Transmission Project Short Circuit Study, 1976-230 kV Transmission System, Minimum Generation at Colstrip", March, 1974, Chas. T. Main. Inc.

II. ELECTRICAL DESIGN STUDIES

A. Overvoltage Analysis:

Initial analog computer simulation studies of the Colstrip 500 kV system were conducted by MAIN using the Westinghouse Anacom computer. Their purpose was to determine the maximum switching surge overvoltages that could exist on the lines under a variety of operating contingencies. Such studies are necessary for all EHV systems before line and equipment insulation levels can be specified. Based on the initial study the maximum switching surge for design purposes is two times the normal voltage and the indicated insulation level for transformers is 1300 kV, for shunt reactors 1425 kV, and for circuit breakers 1550 kV. Surge arrester ratings for transformers and reactors are 420 kV and 468 kV, respectively. The report of this initial overvoltage study is included in Applicants Exhibit 91: "Colstrip Power Transmission Project - Transient Network Analyzer Study", April, 1973, MAIN - STR. An additional overvoltage study is to be made which will utilize the final design parameters of the lines (conductor size, phase spacing, etc.) and equipment (reactor ratings, series capacitor values, breaker characteristics, etc.) Typically, such later studies do not substantially change the recommended equipment insulation levels but can introduce refinements in the design (for example, in breaker pre-insertion resistor values) and can indicate some operating restrictions required to limit transient overvoltages.

B. Subharmonic Resonance:

Subharmonic resonance (sometimes called subsynchronous resonance) is a phenomenon which has, on occasions, been associated with long, series-compensated transmission lines transmitting energy from large thermal generating plants. When it has not been anticipated in the design stages of a system the phenomenon has later been known to result in serious damage to generating equipment. To avoid this a careful analysis must be made of the possible resonant frequencies in the system, which in turn depend on the various combination of the amount of series compensation and the generator's mechanical characteristics. Control of the phenomenon is achieved by proper selection of the amount of compensation, proper specification of the generator characteristics, and, in some cases, through the use of special filters. For the Colstrip system initial subharmonic resonance studies have been conducted for the system with Colstrip Units 1 & 2 in service. Additional studies must be made for the system when Units 3 & 4 are added.

C. Insulation Coordination:

The performance of transmission line insulation must be evaluated to account for overvoltage stresses caused by (1) switching surges, (2) power frequency overvoltages, and (3) overvoltages due to lightning. For the Colstrip lines this evaluation has been made and resulted in the selection of a 25 insulator V-string for the suspension of the phase conductors and an 11.5 foot air gap for the minimum clearance between any phase conductor and the tower steel. This study also determined the maximum 500 kV tower footing resistance should be 30 ohms. For these design parameters the line insulation performance in all three categories of overvoltage will be at acceptable levels. The details of this study are covered in Applicants' Exhibit 91D, "Report on Insulation Performance of Colstrip 500 kV Transmission", July, 1974, Chas T. Main, Inc. Depending on the results of the second switching surge overvoltage study the transmission line insulation performance may have to be reviewed, but it is unlikely the line design parameters will have to be modified.

D. Conductor Selection:

The EHV transmission line conductor selection process must take into account a large number of interacting factors; tower size, span length, wind and ice loading, both conductor and tower capital costs, environmental impact of the corona-related effects (audible noise and radio and TV interference), the different amounts of series and shunt compensation required for different conductor bundle configuration, and operating costs such as those attributable to load and corona losses. The conductor selection procedure for the Colstrip lines considered all of these factors and evaluated a range of conductor sizes in both three-conductor and four-conductor bundle configurations. The conductor configuration which was most economic and had acceptable audible noise, RI, and TVE performance was the four-conductor bundle using Egret (636 MCM, 1.019 inch diameter) conductor size. However, this configuration called for fabrication of a special, higher strength conductor to meet anticipated ice loads, a requirement which proved difficult for the conductor manufacturers to meet. So the recommended conductor was changed to the four-conductor Mallard (795 MCM, 1.14 inch diameter). The size meets the strength requirements, at a somewhat higher cost, and has better noise performance because of its larger size. The noise performance of the Mallard configuration will be covered later in my Testimony. The load and corona loss values used in the economic evaluation for four-conductor Mallard configuration are tabulated below:

TRANSMISSION LINE LOSSES - 4-CONDUCTOR, MALLARD

Line Loading per Circuit	I^2R Losses 6000 hours/yr.		Corona Losses 95% Fair + 5% Foul Weather		Total Losses	
	kV/mi.	kWh/mi.	kW/mi.	kWh/mi.	kW/mi.	kWh/mi.
750 MW	70.6	423,600	1.9	16,644	72.5	440,244
900 MW	101.7	609,984	1.9	16,644	103.6	626,628

As indicated, the corona loss values are based on an assumed mix of fair and foul weather. The underlying data for corona losses for the conductors as provided by Westinghouse did not include the Mallard size but the Westinghouse data does permit an extrapolation to arrive at reasonable estimates of the average fair weather corona loss for Mallard to be 0.4 kW per mile per circuit and the average foul weather corona loss to be 30.0 kw per mile per circuit. The 1.9 kw per mile in the above tabulation is arrived at by taking 95% of 0.4 and adding 5% of 30.0. This is an estimating procedure typically used in a conductor selection procedure to enable the system designer to quantify a variable time such as corona losses. As indicated by the table, the corona losses are a small part of the overall loss evaluation.

E. Shield Wire Insulation:

As the name implies the shield wires (sometimes called ground wires) are placed above the phase conductors at the top of the towers to shield the phase conductors from direct lightning strikes. Without them, in an area of any significant amount of lightning activity, a transmission line's voltage rate would be very high, but their presence in close proximity to the current-carrying phase conductors can sometimes mean significant amounts of steady state current can be induced in them which, in turn, produce additional line losses. To avoid these losses the shield wires can be insulated from the towers and transposed and sectionalized if the costs of these measures can be justified by the savings in losses. The report on the study to determine the economic feasibility of insulating the shield wires for the

Colstrip lines is shown in Applicants' Exhibit 91E, "Report on Insulation of Ground Wires", Chas. T. Main, Inc.

F. Generator Pre-Design:

Transient and dynamic stability studies were conducted to investigate the effect on the system performance of the design of the Colstrip generator excitation and control systems. The results of portions of this work are documented in "Report on the Analysis of Dynamic Stability of Colstrip Generation", February, 1974, Chas. T. Main, Inc., Exhibit 91F.

G. Other Studies:

In addition to the above a large variety of other planning and design studies have been conducted. These have included studies of tower grounding, phase conductor transposition, lightning outage performance, switching of shunt reactors, breaker sizing, series capacitor ratings, surge arrestor requirements, autotransformer top requirements, autotransformer neutral insulation level, unbalanced currents during change-out of single phase autotransformers, and system impedances for relay setting.

H. Electrostatic, Electromagnetic, and Corona Related Effects of the Colstrip Lines:

A variety of environmental effects must be considered in the design of a transmission line. The electrical effects result from the fact that, when operating, the line is energized at a specified voltage and carries load current. The principal electrical effects can be classified as electrostatic and electromagnetic field effects and various corona-related effects.

While all of these effects are present, to some degree, in the neighborhood of transmission lines at any voltage level, the electrostatic and corona-related effects can be more significant at extra-high voltage (EHV) levels. In the United States the EHV voltage levels in operation are 345 kilovolts (kV), 500 kV, and 765 kV. Therefore, these effects receive more attention in the design of EHV transmission lines. However, there is extensive industry experience in the operation of EHV transmission. Through 1973 over 11,000 miles of 500 kV transmission had been placed in service in the United States. At the 735/765 kV levels over 3,700 miles of line are in service in the U.S. and Canada. This operating experience has demonstrated that EHV lines can be designed and operated with minimum adverse effects on the environment.

The studies which have been conducted for the Colstrip 500 kV transmission lines indicate that for the proposed design and the proposed grounding practices the electrical environmental effects of the lines will be at acceptable levels.

ELECTROSTATIC AND ELECTROMAGNETIC FIELD EFFECTS

The electrostatic and electromagnetic effects can sometimes be observed in the form of small currents which may be induced on a conducting object such as an automobile beneath the line. Generally, an observer touching a conducting object beneath the line will not be able to notice these currents. Under some combinations of circumstances, which are unlikely, the induced currents will be above preception levels. However, even under such improbable circumstances, the currents are safe and are similar in effect to the spark discharges one can experience in the home, for example, when touching a water faucet, a light switch, or other grounded object after walking across a carpet on a dry day.

For movable objects, such as vehicles, in the vicinity of a line the induced currents can be kept at acceptable levels by insuring that the line design (principally the minimum conductor -to-ground clearance) takes these field effects into account. For fixed objects (fences, buildings, etc.,) the effects are controlled by suitable grounding practices.

The minimum conductor-to-ground clearances proposed for the Colstrip lines (37' mid-span and 41' at road-crossings) are expected to restrict induced currents on the largest vehicles to values well below the 5 milliamp (MA) level. This 5 mA current level is used as the maximum continuous current that the general public may be exposed to. For transmission line field effects it is a design criterion presently in wide use by various industry groups associated with this problem. It is based on extensive research (principally by Dr. C.F. Dalziel) on what are called current let-go thresholds of people.

The application of this criterion to the design of the Colstrip lines resulted in the proposed minimum ground clearances of 37 feet and 41 feet. The calculation procedure used to arrive at this design is basically that developed by Dr. D.W. Deno of General Electric Company and is a well-established and accepted procedure. Furthermore, the assumptions employed (550 kV line voltage, miximum sag, largest vehicle located in the relatively small area of maximum field strength, and vehicle fully-insulated from ground) all combine to give very low probability of induced currents ever approaching the values calculated. For most vehicles in the vicinity of the Colstrip lines the induced currents will be below the 1 mA level, and most observers will not even notice the current.

In the case of induced currents on fixed objects, suitable grounding practices will eliminate electrostatic effects. Buildings and other structures can be handled on a case-by-case basis. Fences on the right-of-way will be routinely grounded.

The field effects most commonly associated with EHV transmission lines are electrostatic field effects. They exist simply because the line is energized at a high voltage and are independent of the load (current) carried by the line. The AC currents flowing in a transmission line or a distribution circuit generate electromagnetic fields as well. Since currents are the source of these fields (not voltage, as in the case of electrostatic fields) the electromagnetic field strengths in the vicinity of EHV transmission lines will not necessarily be greater than the electromagnetic field strengths near lower voltage circuits. Depending on phase conductor spacing, conductor height above ground, the load current magnitude, the electromagnetic field effects of many lower voltage circuits can exceed those of EHV lines. However, it is still necessary to evaluate electromagnetic-induced effects for each specific line, particularly for an area of long fences such as that traversed by the proposed Colstrip lines. In general, electromagnetically-induced voltages and currents on vehicles and buildings in the vicinity of a line are negligible, but those on long fences parallel to the line are not.

An evaluation of both electrostatic and electromagnetic fence wire beneath the Colstrip lines has been made. Both normal operation and emergency (fault) conditions were considered. The most severe condition for a fence on the right-of-way (R-O-W) was found to be an electromagnetic effect due to normal load current. This is the basis for the recommendation that any fence on the R-O-W parallel to the line should be grounded every 100 feet to keep the induced current below 5 mA. Fences crossing the R-O-W should be grounded at each edge of the R-O-W and at every opening (such as a gate) on the R-O-W.

CORONA-RELATED EFFECTS

The other major area of electrical environmental effects of a transmission line is that encompassed by what are called corona-related and arc-discharge effects. Under certain weather conditions, principally light rain or heavy fog, an observer standing close to the line will be able to hear a crackling or hissing sound. This audible noise effect results from an electrical breakdown of the moist air principally in the immediate vicinity of the water drops which form on the bottom of the conductors under such weather conditions. This electrical breakdown of the air is called corona. It can also occur in fair weather in the vicinity of nicks or scratches on the conductor surface, but this cause of corona can be controlled by careful handling of the conductor during construction of the line.

Corona and, also, gap-type discharges which can take place on the hardware supporting the conductors on the towers can, in some situations, produce electromagnetic noise in the radio and television frequency bands. This noise is the cause of what are called the RI (radio interference) and TVI (television interference) effects of transmission lines.

The major factors which influence these effects are: the line design parameters (principally the number, size, and spacing of the subconductors in the bundle) and weather conditions.

For the proposed Colstrip transmission conductor design, the predicted foul weather audible noise at the edge of the R-O-W is 53 decibels (dB(A). Based on public surveys conducted by the Bonneville Power Administration, the 53 dP(A) level is at the lower end of the range of noise levels (52.5 to 58.5 dB(A)) in which moderate or some complaints can be expected. Audible noise attenuates as one moves away from the R-O-W. Even in areas of greater population density than that traversed by the Colstrip lines, audible noise should not be an annoyance problem.

The radio interference performance analysis for the Colstrip transmission lines is based on radio noise (RN) calculations for different conductor sizes (by use of a Chas. T. Main computer program using empirical formulas), on AM broadcast station signal strengths computed along the line route (performed by Westinghouse), and on census data of population density in the counties traversed by the Colstrip 500 kV transmission lines.

For the area traversed by the Montana transmission line (mostly rural and sparsely populated), protection of Type "B" broadcast service from line noise was chosen as a primary design parameter.

The results of the analysis are:*

> The predicted fair-weather RN level is 46 dB above 1 mV/m at 1 MHz at the edge of the 300 foot R.O.W. (The average foul-weather RN will be about 20 dB higher).
>
> With a width of R.O.W. of 300 feet, about 20% of Type "B" stations will receive Class "B" service (S/N=24 dB) at the edge of the R.O.W. However, due to the appreciable lateral attenuation of radio noise, households located further than 150 feet from the edge of R.O.W. will receive 100% of Type "B" stations with signal-to-noise ratio of 24 dB.

Considering the sparcity of population along the proposed line route, the environmental impact of the 500 kV transmission lines from a radio noise viewpoint is expected to be minimal.

On some lines, TVI produced during fair-weather conditions has been caused by gap-type sources. Careful line construction practices will eliminate this source of interference. Conductor corona discharges during foul weather can also produce TVI. However, line design measures taken to reduce RI will also reduce TVI. Based on the four-conductor bundle selected for the Colstrip lines television interference is not expected to be a problem if good construction practices are followed.

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*Considering:

- 4-795 MCM (Mallard) phase conductors
- 4,000 foot average line altitude
- 500 kV line voltage
- delta tower configuration, with average phase spacing of 37 feet
- 18 inch subconductor spacing

In conclusion, the overall environmental effects of the two 500 kV transmission lines will in all instances be minimal and within acceptable ranges. In fact, due to the selection of the Mallard 795 conductor with 4 conductor bundle configuration, the effects will be in lower range of the measured effects on 500 kV lines in operation in the United States.

MR. PETERSON: Mr. Davis, I have a few corrections relative to typographical errors. On page 7 at line 12, "TVE" should read TVI. On the same page, on line 27, it should read kV per mile, and the first column should read kW per mile. On page 8 at line 12, the word "variable time" should read item, I-T-E-M.

HEARINGS EXAMINER: Now does that replace "variable"?

MR. PETERSON: The word "time" should read item. On line 20, "voltage" on that line should read outage. On page 9, line 16, "top" should read tap, T-A-P. On page 11, there's a misspelling of the word on line 24; where it says "miximum" it should read maximum. And with that, Mr. Davis, I will now move into evidence Exhibits 91, 91-A, 91-B, 91-C, 91-D, 91-E and 91-F.

HEARINGS EXAMINER: Very well, you may cross-examine, Mr. Shenker.

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Mr. Ender, among the publications which you have made, sir, you list one with the title "Progress in Total System Planning?"

A Correct.

Q Are we making progress these days?

A I believe so.

Q Good. Could you describe that for us?

A Well, in that general terminology, that was a paper that I coauthored about ten years ago. In the context of total system planning, I think the progress that has been made has been largely in the methodologies employed, in other words, the use of large-scale digital computers and the taking advantage of those to better plan utility systems.

Q What is the result of such better planning?

A The net result, hopefully, is to produce information for utility management which will enable them to make better decisions about what to do about the future system. It's characteristic of the utility business that there are very long lead times required to install the capacity you need to meet future loads; and utilities in this country as opposed to some other countries are generally required by state regulations to meet the demand that is placed upon them, no matter what it is. So, therefore, they have to plan 10, 20 and sometimes 30 years in advance to meet the expected load requirements in the future.

Q Is this sometimes called load management?

A Oh, no.

Q What is load management?

A Load management is an operating tool; it's a control of loads to meet different objectives.

Q Has any progress been made in the area of load management?

A Yes, there is progress and there is considerable experimental work going on in those areas these days.

Q Do any of these projects work?

A Well, I haven't really studied the field that carefully. I can just give you my impression of some of the papers I've read. I can think of one activity down in Arkansas which is an attempt to do what we call build in diversity into the turn-on time of air conditioning units. In general, without this type of effort, when we have a heat wave or a hot spell on a summer afternoon, all of the window air conditioning units will come on at the same time and impose a peak demand on the utility system. If we can somehow control those air conditioning units so that they come on at different times, then that is what we mean by building in diversity into the load.

Q Then that would have the result of leveling out peaks?

A Correct. That's one example of load management experimentation work that's going on right now.

Q Have you looked into the extent to which any of the applicants in this proceeding are embarked upon such load management?

A No, I have not.

Q Is it a good thing to do?

A In general, I think it is a good thing to do, yes.

Q Have you looked into the extent to which any of the applicants in this proceeding are using the kind of tool which you described to me a moment ago from the cue of your paper, "Progress in Total System Planning"?

A No.

Q Another of the papers which you authored or contributed to is entitled "Electric Energy from Interconnected Systems"?

A Yes.

Q Can you tell me what that was about?

A That was an invited paper presented at a national meeting of the Pulp and Paper Industry Association -- actually it's called the Technical Association of Pulp and Paper Industry. That's really the correct title of the organization, and that was a paper to describe the advantages and disadvantages of obtaining power for a remotely located pulp mill, for example, from the utility system as opposed to having on-site generation equipment itself.

Q Are there some members of the pulp and paper industry who are looking at the question of on-site generation from such things as surplus steam capacity?

A Yes, certainly they are; they have for many years. The trend in the industry, it's interesting to note, though, -- one of the conclusions that we noted in that paper was that back in the 1930's, I don't remember the precise dates, the on-site generation capacity of all the pulp and paper industry facilities in the country was about 30 to 40 percent of the total. Today, it's about one quarter of that, so the trend is toward less on-site generation.

Q That, I suppose, Mr. Ender, would have something to do with the economics of whether it's cheaper to get the power from outside or generate it inside, wouldn't it?

A It has to do not only with the economics, but the reliability of supply and things of that sort, too.

Q It would have also something to do with the amount of supply that they saw that they needed?

A Certainly.

Q Has anything changed in the technology of, for example, the pulp and paper industry and their ability to generate on-site power?

A Well, the biggest changes that have favored the trend away from on-site generation have been the economies of scale that have taken place over the past 20 to 30 years in the utility business.

Q I asked you about technology, not economics?

A Well, it's technology. It's the more efficient generating units that the utilities are able to justify on a large-scale basis, and the pulp and paper mill is not able to justify because it has to have a smaller unit.

Q In terms of the actual delivery of the power on site, have there been any changes in the technology available to accomplish that for such industries as the pulp and paper works?

A I don't know what you mean by that question. I know of no changes in the technology as such. Most pulp and paper mills are delivered at what we call a relatively low voltage, say 115 KV or below, like most industrial firms, and that technology has remained pretty much the same. There have been improvements in equipment installation and in the economics of buying equipment of different sizes, but these are more steady improvements that have taken place in the business over the years.

Q I take it there has been some progress, as it were, or development of technology in how best to use such surplus steam capacity as pulp and paper mills may have for the delivery of on-site power?

A I'm sure there have been improvements in boilers and this sort of thing, too, yes.

Q Okay. Now in your statement, Mr. Ender, you refer to losses from the transmission lines under the present proposed configuration of four bundle conductor mallards, and you refer to losses per mile. Would it be correct for us to compute the total line losses simply by multiplying the miles times the kilowatt-per-mile lost?

A Correct.

Q So if we wanted to look at the kilowatt-per-mile loss for 900 miles, for example, as shown on page 7, line 28, would we multiply that times 103.6?

A Yes, if you were calculating the demand component to losses, that is correct.

Q And we'd get a sum of something in excess -- have you worked it out precisely?

A No, I have not.

Q It would be something in excess of 90,000 kilowatts?

A Correct, 90 megawatts.

Q 90 megawatts. Now is that an average figure based upon your 95 percent fair weather, 5 percent foul weather computations?

A Well, now you're talking about a different part of the loss picture; the corona losses are what the weather distributation affect. The corona losses are a small part, as these figures on page 7 of my testimony show; the corona losses are a very small part of the total losses.

Q About 10 percent?

A Yes. The total losses are dominated by what we call the normal load losses, what we call here the I squared R losses.

Q Now those losses, the I squared R, or normal load losses will occur no matter whether you have good weather or bad weather?

A Correct.

Q And that's just a function of transmitting power over a long distance?

A Yes.

Q So the only variability we'd have would be the corona losses?

A Right.

Q As to the corona losses, is the figure that you have used an average figure based upon 95 percent fair weather, 5 percent foul weather assumption?

A Yes.

Q So that at any moment of time it would not be correct to say that the maximum losses are 103.6 kilowatts per mile or 90 megawatts; it could be more or less depending upon weather interference?

A Certainly.

Q Have you by any chance, Mr. Ender, worked out your formula to see what would happen if at some moment in time, over a day for example, you were dealing with 95 percent foul weather and 5 percent fair weather to see what your line losses would be that day?

A No, that would be an academic exercise, in my opinion. The purpose of corona loss evaluations -- the numbers that we've used in the testimony here and, of course, the much more extensive set of numbers we used in all of the conductor evaluations we did on the Colstrip lines, the purpose of corona loss evaluation is to examine the effect of the losses for different subconductor sizes on the conductor selection process. And, therefore, we must use average figures over a long period of time. So what would happen on any one day would be a distortion; it would not be pertinent to our goal of selecting a conductor size on an economic basis.

Q I understand the process you went through, Mr. Ender, and why you did it. What I'm interested in knowing is whether we could look today to see what the actual line loss would be on any given day if you had the 525 kV lines -- they are 525 kV lines, aren't they?

A Well, we call them, as a class, 500 kV lines; in this case I believe the goal will be to operate them at 525 kV, yes.

Q Okay, if you had those lines operating from Colstrip to Hot Springs, and Colstrip 3 and 4 were generating the power which was sending the juice along the lines, how much line loss could we expect? Now, we can apply your formulas, can we not, in order to determine the corona losses with various percentages of fair to foul weather?

A No, that wouldn't be a practical exercise in my opinion because the weather varies along the length of the line, and you might have one section where the corona losses will be very high and on the rest of the line they will be very low.

Q It would be a difficult exercise to perform?

A Well, it would require a statistical analysis of weather conditions at different sections of the line and an evaluation of the length of the line that was influenced by those weather conditions, and it would not serve any purpose. The real purpose of corona loss evaluations in the context that we've used them here is to look at the relative economics of different conductor sizes, and the absolute magnitude of the corona losses is not of consequence in that evaluation.

Q We know that the absolute magnitude is 10 percent, approximately, right?

A On an average basis it's 10 percent, yes.

Q Now, when we look at the corona loss range, depending upon whether you have fair weather or foul weather, you're talking about an order of magnitude of something like 60 to 1, aren't you?

A That's probably a reasonable ratio; I'm not sure precisely how correct that is.

Q Well, it ranges from .4 kilowatts per mile per circuit in fair weather to 30.0 kilowatts per mile per circuit in foul weather?

A Right.

Q By the way, what do you mean by so many kilowatts per mile per circuit?

A It means that if we wanted to look at two circuits on a right-of-way, then the losses on those two circuits would be double that amount.

Q So when we're talking about two 525 kV lines running from Colstrip to Hot Springs, we will be talking about 60 kilowatts per mile on foul weather; would that be correct?

A For both circuits, yes.

Q On page 10 of your statement, Mr. Ender, line 13 through 16, you state your conclusion that your studies will provide acceptable levels of electrical environmental effects?

A Yes.

Q What are those effects?

A The electrical environmental effects of EHV, that is extra high voltage transmission lines, generally are in the areas of what we call electrostatic field effects and electromagnetic field effects, and corona related effects. These are manifested in terms of their impact on people in the vicinity of a line in terms of -- in some cases you can notice the fields; as you walk beneath a line, there may be such phenomenon as hair nerve stimulation; you can feel the hair on the arm or on the head affected by the field. Also, the corona related effects are manifested by such things as audible noise and in some cases radio static as it's called, radio and television interference phenomenon.

Q You state, of course, in your testimony that the electrostatic and the corona related effects are more significant at the extra high voltage levels?

A Yes.

Q What do you mean by extra high voltage levels for the purposes of that statement?

A The term EHV, extra high voltage, as used on an international basis, is defined as the range of voltages which encompasses all transmission lines with a voltage of greater than 242 kV up to and including 1000 kV.

Q Do you know of any transmission lines in Montana between Colstrip and Hot Springs which are extra high voltage lines?

A No, I do not.

Q At the time that your deposition was taken last year, Mr. Ender, your conclusion was very much the same as it is in your statement, that the proposals made by C. T. Main will result in acceptable levels of environmental effects from the transmission lines. You would agree that you haven't changed your conclusions on that?

A Yes.

Q At that time, sir, you had not then reviewed the criteria of the Montana Utility Siting Act; have you done so now?

Q Yes. Following the taking of my deposition in Portland, I requested a copy of that act and I reviewed it within a few weeks after I had received it in Boston, and that was probably 9 or 10 months ago now.

Q As a result of your review of that act some 9 or 10 months ago, to the extent that you can remember it, do you have any revisions to make in your thinking?

A No, I do not.

Q Good. Also on page 10, under the heading "Electrostatic and Electromagnetic Field Effects," at line 24 you refer to some circumstances in which induced currents will be above "preception levels." What would that be?

A That's another typographical error.

Q It should be perception?

A Perception is correct.

Q And I take it it just means you can see things at those levels, or feel or experience things at those levels?

A You can perceive the currents at those levels; that's what that means.

Q Perception refers to human senses of perception?

A Correct.

Q All right, and you've described some of them; the hair stands on end; others would be the ears perceiving through interference with radio; others would be the eyes perceiving through interference with television?

A Yes.

Q And you have no doubt, have you, Mr. Ender, that under some circumstances transmission lines indeed do create situations that become dangerous to people?

A No, I don't agree.

Q You think there are no circumstances in which transmission lines create situations that will become dangerous?

A In terms of their effect on the general public on the right-of-way beneath the lines, I know of no harmful effects that EHV transmission lines have imposed upon the general public.

Q Well, I don't think you mean to say that quite so broadly, Mr. Ender, but let's find out. Whether transmission lines are dangerous depends on a number of circumstances that are not in the control of the people that construct the transmission lines; isn't that true?

A Yes.

Q And transmission lines are dangerous to small boys flying kites, for example, aren't they?

A Well, so is a superhighway if a small boy crosses a superhighway.

Q Yes, indeed, that's why we have hearings to determine the environmental effects regarding highways going places, but we're now talking about transmission lines. You will concede, will you not, that there are circumstances in which transmission lines are dangerous?

A Yes.

Q On page 11 of your statement, Mr. Ender, at line 17, you refer to research that has been done on the subject of current let-go thresholds of people; what does that mean?

A The research into the effects of electrical currents on people has generally been classified into several areas; the lowest area of effects are what we call perception levels of current; the second level is let-go areas of current, we're talking about magnitudes of current now, and then the third area is current levels which cause what is called ventricular fibrillation, that is an arrhythmic action of the heart, and we are talking about much higher levels of current when we are talking about that.

Q By heart you mean people's hearts?

A Certainly. Now the research that has been done in these areas is pretty well dominated by the work of Dr. Charles Dalziel, I believe, at the University of California, and what I am referring to in my testimony here is the work he did on let-go thresholds of people, and he had studied a large sample of people. I think there were -- well, I can get the precise numbers if you want them; I have his papers here. But in general, what he did was to try to determine the statistics of these people in terms of the largest current level at which they could still let go of an energized conductor. So that if this is a test situation, a laboratory situation, you hold an energized conductor in one hand and your feet or your other hand is grounded, and the current that passes through your body is gradually increased, and at, let's say a level of 5 milliamperes, which is 1/1000th of an ampere, if the person is able to let go then we know he has not yet reached his let-go threshold, so then you increase it to 10 milliamperes and if he's still able to let go, you still haven't reached the threshold. And you keep increasing it until he cannot let go any further, and this is caused by the fact that the electrical current apparently has an effect on the muscles in your hand and your ability to control those muscles.

Q And that's how some people get hurt; they simply can't let go and as a result the current continues to flow into them and injures them; is that right?

A Well, it may not injure them but they cannot let go until they are knocked loose from the conductors or something of that sort.

Q It's not good for them to keep holding onto the conductors, is it?

A Well, now we're talking about very low levels of current and just because you have exceeded your let-go threshold does not mean that it is dangerous for you in terms of causing injury or death.

Q There is a level at which, when you continue to hold on, you will find it's dangerous to you?

A Right. Then we're getting into the next area which is called ventricular fibrillation currents and they are up in the order of 100 milliamperes, sometimes less than that.

Q I suppose that that problem with current is one of the reasons that you engage in appropriate design practices such as grounding of objects that maybe come in contact with conductors; is that right?

A No, we don't want to ground objects that come in contact with the conductors if you're talking about transmission line conductors. We don't want anything to come into contact with the transmission line conductors.

Q Why do you ground things?

A Now what we're talking about in grounding practices are the grounding of objects in the vicinity of transmission lines, and these are objects which, because of their shape or size, can have currents induced upon them by the fields of the transmission lines, and those are the current effects that we want to eliminate or minimize.

Q So if something comes in contact with the conductor itself, there's no precaution that you've taken in advance of that except to avoid things coming in contact with the conductor?

A Yes, if you come into contact with any conductor, you are almost invariably exceeding the currents we are talking about, induced effects under lines.

Q Okay. So the grounding and precautions of that kind are not for avoiding direct contact with conductors of current, but for dealing with the field effects of induced current?

A Correct.

Q And some of the objects that give you the greatest concern, I take it, are the longer objects, like fences?

A Well, it depends on the fields we're talking about. Now, under EHV lines, because of their higher voltage. the electric fields are more significant than they are under lower voltage lines and, therefore, generally under EHV lines we are concerned about large objects, vehicles and so forth, that might pass beneath the lines. Therefore, by modifying the design of the line we try to control the magnitude of the worst case induced current that can be induced on those large objects.

Q And when you look at electromagnetic effects, then you're concerned about long items like fences, right?

A Normally electromagnetic effects dominate the fence condition, yes.

Q And these long fences are not negligible concerns are they?

A No.

Q When you get to the area of corona related effects, that's when you're talking about interference with radios and television?

A Yes.

Q And the interference with radios and television is usually measured in terms of the sound level in decibels, isn't it?

A Well, now you're talking about audible noise when you're talking about sound levels; now the interference level for radio and television is also measured in decibels, but it's not a sound level then, it's an electromagnetic -- I don't know if you'd call it a white noise, but it's a noise phenomenon in the electromagnetic spectrum at frequencies comparable to radio and television frequencies.

Q As I understand it, for your proposal on the Colstrip transmission lines, you are looking at a predicted foul weather audible noise at the edge of the right-of-way of 53 decibels; is that right?

A Yes.

Q Now you know that at that level you can expect some complaints, right?

A Not necessarily. In order to have complaints you have to have an observer; you have to have someone there to hear it, so there wouldn't necessarily be complaints if there aren't any people in the vicinity of the lines.

Q Well your statement tells us, Mr. Ender, that the Bonneville Power Administration survey has a range of noise levels of 52.5 to 58.5 in which moderate or some complaints can be expected?

A Yes, that's the nature of their survey; that's right for lines which pass in the vicinity of residential areas.

Q And I take it the expectation of complaints will be that folks will say, "There is interference with our radios and television"?

A Well, now that audible noise is one area; radio and television interference is another area. Just because you have a complaint or a comment that there is an interference in one area of activity doesn't mean there will be complaints in the other.

Q You're talking then, when you look at the Bonneville Power Survey, of the complaints that you expect from people, unrelated to their radio and television interference, simply because they hear noises that are disturbing to them, which come from the transmission lines at the edge of the right-of-way?

A Yes. The Bonneville Power Administration survey is strictly confined to audible noise effects.

Q If you'll turn to page 15 of your statement, Mr. Ender, you refer there to an analysis in which you predict fair weather and foul weather RN; what is RN?

A Radio noise.

Q Radio noise. And in foul weather, as I understand your analysis, you would have 66 decibels measured on the average?

A Yes.

Q Do you expect that that will interfere with radios?

A At the edge of the right-of-way, yes, in foul weather. Of course, one phenomenon of foul weather, too, is it effects the signal strength of the transmitting station as well, so there are combined effects; you may not, even without the transmission line there, be able to receive the radio station.

Q Well, you already have foul weather interference with radio or television as a possibility, and what happens is the additional potential interference that comes from the transmission lines?

A Right.

Q And your conclusion on page 15 is that given the sparsity of population along your proposed line route, the interference from a radio noise standpoint is minimal?

A Yes.

Q Now, of course, it's not minimal to any individual who happens to be affected; what you mean is that it is minimal on the average as you look over the entire route of the line?

A Yes. The radio -- one of the characteristics of any of these noise phenomenon, audible noise as well as radio noise, is that it attenuates very rapidly as you move away from the right-of-way, and we do not expect there to be any significant number of residences within two or three hundred feet of the right-of-way edge.

Q Well, you keep saying things like, "insignificant number of," and "acceptable," and "minimal" and things of that sort, but what you mean by that is, when you look over the broad range of all the people who are in the areas which your transmission lines will traverse, that in those circumstances the interference, or whatever, will be insignificant; isn't that right? You're looking at the overall conflicts?

A Yes.

Q All right. For example, therefore, on line 18 of page 15, when you point out that line design measures will reduce radio interference and reduce television interference, you don't want us to believe that there will be no radio or television interference that comes from the transmission lines?

A No, I'm sure you can always find some place in the vicinity of any transmission line where you might have radio interference.

Q And in the conclusion of your statement, Mr. Ender, you find that because of the selection of the mallard 795 conductor with the four conductor bundles, the effects of your transmission lines as proposed will be in the lower range of measured effects, right?

A Yes.

Q And I want it to be clear that that means that it will be within measured effects. If we can look at effects, Mr. Ender -- you looked at me puzzled there; I think I'd better clarify my question for you. If we can look at effects -- I take it there are measured and non-measured effects?

A What I mean by this is it's in the lower range of the experience of measured effects on existing transmission lines in the United States.

Q I understand that.

A Now there are -- we are talking here in terms of certain criteria, for example, the established criteria for radio noise interference effects is that if the signal-to-noise ratio is 24 or greater, we do not have an interference problem. So you could still measure effects, but as long as you are within that range, you're all right.

Q Mr. Ender, when you talk about effects, it is true, is it not, that there are both measured and non-measured effects?

A Well, can you give me an example of a non-measured effect? I don't know what you mean by that.

Q Are there not effects of transmission lines which are subjectively determined by people who perceive them or complain?

A Well, this statement is in the context of noise from transmission lines. Are you talking about effects in other areas, like biological effects?

Q Sure. I was talking about the broad range of effects. Is this statement only supposed to refer to noise?

A No, I guess I stand corrected. That is my final statement; that applies to all effects, yes.

Q Okay, if you talk about all effects, there are some that have not yet been measured; isn't that true?

A Certainly.

Q Okay. And, therefore, there are both measured and non-measured effects. Your conclusion and your statement is, with respect to measured effects, you expect these transmission lines to produce those effects which are now in the lower range of those that have been measured; isn't that it?

A Yes.

Q We talked earlier about the expectation of the operation of the transmission lines at 525 kV, and we know from testimony of Mr. Zobel that the line can be expected to operate safely at 580 or 590 megawatts as well. It is true, is it not, Mr. Ender, that for every 5 percent increase in operating voltage above 500 kV, you can expect an increase of 20 percent in corona loss?

A I'm not sure if that's correct or not. That's -- I've heard of figures of that order of magnitude.

Q That figure came from your predecessor, Mr. Nescos, who was with C. T. Main doing your job before you succeeded him?

A Yes.

Q Where is Mr. Nescos these days, by the way?

A He's in Tehran, Iran.

Q He was on the way there when your deposition was taken last spring; has he been there all the time since?

A Yes.

Q He's not made any visits back to the States?

A No, for tax reasons he likes to avoid that.

Q Further on the subject of corona losses, Mr. Ender, if there is a change in altitude from 1000 to 6000 feet, there is an expected increase in the corona loss of 30 percent, is there not?

A I'm sorry, I'd have to check my tables to find out if that is correct. I know there is an increase. Our corona loss calculations were based, I believe, on an average elevation of 5000 feet.

Q Well, if that were Mr. Nescos' view as reported by Mr. Greve in his deposition last May, you would accept that, would you not?

A Well, if you are trying to pin me down, I would like to check it; I assume it's right.

Q You would have no reason to differ with Mr. Nescos, if that were his view? He's not a fellow who does a bad job of evaluating what corona losses are?

A Well, you see, we're talking about sort of secondhand information; this is Mr. Greve's estimate of what Mr. Nescos said, as I understand your question.

Q No, it was a letter from Mr. Nescos to Mr. Greves of June 28, 1973. So it would be Mr. Nescos' view as expressed in a letter?

A I see. Then I would put more credence in it.

Q Sure. Now you entered the picture for C. T. Main Company in connection with the Colstrip project, in any significant way of spending oodles and scads of time, in about February of last year?

A Yes.

Q Prior to that you'd had some nodding acquaintance with the Colstrip project and had contributed to some of the reports that were made; is that right?

A Yes.

Q In reviewing the files and reports on the Colstrip project, Mr. Ender, did you note the view of the folks at C. T. Main from the time essentially since they entered the picture in January of 1973, that as soon as the Montana Utility Siting Act was passed a couple months thereafter, it was known that there would be great difficulty in meeting the original schedule for the Colstrip units 3 and 4?

A I don't recall reading that correspondence; I could have read it.

Q After Mr. Taylor's deposition was taken, the then project engineer for the Colstrip project, did you review his deposition?

A No, I did not.

Q In December of 1974, Mr. Ender, just a couple of months before you succeeded Mr. Nescos in connection with the Colstrip project, Mr. Evans, on behalf of the Colstrip project management, wrote to Einar Greve, who was then the project engineer, with a copy to Chester Taylor who was soon to succeed Mr. Greve, in which he said that it would be to the best interests of the Colstrip project management if they could obtain in writing two items from C. T. Main. One was a detailed statement of the design criteria for 500 kV transmission. The second was a detailed copy of methods and calculations employed in generating results contained in the study of electrostatic induction for the Colstrip transmission, as last revised in May of 1974. Had you run across that letter in your review of the files?

A I believe I remember that letter, yes.

Q You recall Mr. Evans' view, then, that it was necessary for the Colstrip project management to have that information in detail for file purposes in the event of any future legal action against the Montana Power Company arising out of the effects of 500 kV transmission. Now what would have been contemplated by the reference to future legal action against the Montana Power Company arising out of the effects of 500 kV transmission?

A I don't know.

Q I asked Mr. Zobel while you were here this morning, Mr. Ender, whether he was familiar with this cost benefit analysis proposal prepared for Westinghouse by CONCAP Research Corporation; are you familiar with that document?

A No, I'm not.

Q I think you were the fellow, Mr. Ender, who put together a nice bibliography of papers on electrostatic and electromagnetic effects prior to the time your deposition was taken?

A Yes.

Q There were some 64 of those items which you had listed in the eight pages of bibliographical references; they date pretty much up to the time of your deposition as far as publications were concerned, late 1974, and they date back to 1967, which I think is the earliest of the references you had. Was this intended to be an exhaustive research of the literature, or simply some of the items that you could put your hands on and compile in a reasonably diligent manner?

A No, our objective was not to produce an exhaustive listing of papers, but to list those that we had read and had received in our office.

Q You would expect the literature to be substantially greater than the ones that you had read in your own office?

A I don't know that it would be substantially greater than that list; I really have no way of knowing that.

Q There was a meeting that took place at the C. T. Main office in Charlotte, North Carolina on February 6 and 7 of 1975, to review the Colstrip project in which the scope of the testimony of C. T. Main witnesses was discussed in some detail. Were you present at that meeting, sir?

A No. You asked me that in my deposition and I was otherwise occupied at that time.

Q Right. I knew, but the record didn't know yet, so that's why I had to ask you that. The scope of the testimony focused in part on that which was to be given by Einar Greve, and at that time the folks who were there in your absence elected you as the substitute to Mr. Greve, since you weren't there to defend yourself. Did you know prior to the time of that meeting in February of 1975 that the honor would fall upon you to give the testimony outline then?

A No, I did not.

Q One of the statements in the minutes of that meeting compiled by your C. T. Main people was that your company would compile and organize your information so as to effect maximum impact at the hearings. There were a number of requests made of C. T. Main by Mr. Evans, on behalf of the Colstrip project management, some of which were withdrawn as your responsibilities in preparation for the hearing. We'll get to some of those in detail in a moment. What I'd like to ask you, sir, is whether the assignment that you compile and organize the information so as to effect maximum impact at the hearings was also withdrawn?

A Not that I know of.

Q So you followed that assignment then in preparation for this hearing?

A We tried to.

Q Do you happen to have handy, Mr. Ender, a copy of the minutes of that meeting from any of the papers that you have before you in the desk?

A No, I do not.

Q That's an impressive assemblage of papers that you have there.

A I tried to be prepared.

Q I appreciate that. Have you recently reviewed those minutes to recall what the assignments were that were made at that time?

A No, I have not.

Q Here's my copy then.

(Mr. Shenker shows copy to witness.)

Q These were the minutes of the meeting of February 6 and 7, 1975 at the Charles T. Main offices in Charlotte, North Carolina. That's Mr. Zobel's headquarters, right?

A Yes.

Q That was Exhibit number 13 to his deposition. In preparation for these hearings, the minutes say, and in anticipation of what Montana Power Company's lawyers may want, your company was asked to do the following work: 1. Reevaluate the needs for units 3 and 4. You were asked to review but not alter the most up-to-date load and resource information from each of the participating companies and of the integrated Pacific Northwest pool. Now that reevaluation was withdrawn on February 10, 1975, some three days after the meeting?

A Yes.

Q You understand that?

A Right.

Q Was it to have been your assignment to have carried through with that item number one?

A That would have been part of my responsibility, yes.

Q Do you know why that assignment was withdrawn?

A No, I don't. I would guess it was because the basic planning for Colstrip 3 and 4 and the future load requirements in the Pacific Northwest power pool were all -- all of that was done before Charles T. Main was brought into the picture for the design of the transmission lines.

Q Now, the second item of assignment Charles T. Main discussed at that meeting in February of 1975, which was a week before the first meeting that we had in connection with this formal hearing here in Montana, was that the Charles T. Main Company was to evaluate the economics of alternate generation, type, size and location, review the sections of the Environmental Impact Statement report dealing with the problem, and also review the study made by Mr. Dick Davenport of the Montana Power Company on the economics of installing a 350 megawatt unit at Colstrip and shipping coal by rail to a location outside of Montana to provide the equivalent of 1050 megawatts of thermal generation. Now that evaluation was also withdrawn on February 10, 1975; do you know why that was withdrawn?

A No, I don't.

Q Would you have participated in that evaluation?

A Yes.

Q The remaining assignment, of course, is the one that you are performing for us today, that is to summarize the impact of transmission, radio interference, AN, audible noise, and EI?

A I don't know what EI means.

Q You were to look at the acreage actually removed from production, provide appropriate graphs and slides, look at the report by Leo Finnegan on the impact of unit trains to be sent to George Nescos, a report on electrostatic induction tests on fluorescent tubes, update your estimate of the cost per mile of transmission line based on material and labor data now on hand, noting that the Montana Power Company was then using a figure of $152,000 per mile. Is any part of that assignment withdrawn from what you are supposed to be doing here?

A Well, I believe the report by Leo Finnegan on the impact of unit trains to be sent to George Nescos was withdrawn from our scope of work, I think, along with the items one and two.

Q On the minutes it doesn't indicate that one was withdrawn, but you in any event have not seen Mr. Finnegan's report and you have not evaluated that problem?

A That's right.

MR. SHENKER: Do you want to take a recess now?

HEARINGS EXAMINER: Well, let me ask you a question; is this man under any travel restraints this afternoon?

MR. ENDER: Well, I have a plane reservation at 1:35. I need my ticket changed and they told me I should be there at 1:00 in order to do that. I'm willing to stay on though, whatever you feel.

HEARINGS EXAMINER: All right, let's go ahead and finish this gentleman up, if that is agreeable with everyone.

Q Mr. Ender, your office, that is to say C. T. Main Company and the Boston office particularly, has engaged in the kinds of evaluations which I have just described for you out of the minutes of that February 6, 1975 meeting in the past; isn't that true?

A Yes.

Q And you had the capacity to do that with the staff and the professional expertise that you have there in your office?

A Yes.

Q Despite the fact that that assignment was withdrawn, you didn't by any chance dabble in it a little bit yourself to see what your results might have been?

A No. I began to look at some of the Environmental Impact Statement material that was prepared by DNR, I believe, and started to develop some approaches to that, but I didn't complete it.

Q And would it be fair to say that you simply did not get into the reevaluation of the needs for units 3 and 4 or to the evaluation of the economics of alternate generation?

A Yes, it would be fair to say that.

Q Now the reason that you were not at the meeting in North Carolina on February 6, 1975, Mr. Ender, was that you were in South Carolina that day before the Public Service Commission of South Carolina?

A Yes.

Q You were giving testimony in that proceeding on behalf of the South Carolina Electric and Gas Company?

A Correct.

Q And in that proceeding you stated your view, which I take it still to be your view, that in the coming years, economics of the generation of electricity will weigh heavily in favor of nuclear plants?

A I don't remember saying that, but if I did -- do you have a copy of my testimony?

Q Yes.

A I see.

Q Don't you remember that? I told you that on your deposition that I already had a copy of your testimony?

A No, I don't remember.

Q I was kind of proud of getting it so quickly. Now, in that proceeding as well, Mr. Ender, you addressed yourself to the nature of hydro as a resource for power, noting that conventional hydro is a very flexible source of power generation; is that still your view?

MR. PETERSON: I object to this line of questioning, Mr. Davis, on grounds that it is immaterial and irrelevant to the testimony presented by this witness.

HEARINGS EXAMINER: I don't see anything in the scope of the direct on it. I think it's outside the scope of the direct, but I'll permit some questions on it if they're not too lengthy and too far afield.

Q Do you know the question, Mr. Ender?

A Would you repeat it please?

Q Certainly. In discussing the use of hydro as a resource for generating power, it was your view, was it not, and is it not still your view, that it is a very flexible resource?

A I believe my comments in my testimony in South Carolina were related to pump storage hydro, a rather unique type of hydro capacity.

Q Is that a flexible resource?

A It's a very flexible resource.

Q Why is it so flexible?

A It enables you to essentially improve the economics and utilization of your base load generation by utilizing it at nighttime periods when the normal load conditions are light, to pump water uphill into a reservoir and then let that water flow downhill through the generating units in the daytime when you have peak load conditions.

Q Well, actually your testimony about pump storage came immediately after your comments about conventional hydro, and to quote it exactly your testimony was, "Conventional hydro is very flexible and would usually fill the middle range, unless otherwise governed by river flow requirements"?

A I see. Well fine, you have a better memory than I do of my own testimony.

Q You would accept that still as a correct statement, would you not?

A Yes.

Q The typical way that you approach your testimony, when you have to look at load forecasts and resource analyses, is to look at the utility company's figures for review and that's the basis of the testimony that you will then evaluate, right?

A Basis of the testimony that I will evaluate? I don't understand the question.

Q That's the basis on which your testimony will be predicated I should say?

A That is the approach that I used in the South Carolina case.

Q All right, and that's a typical way to proceed; is it not?

A Yes, if the objective of my testimony is to comment on the load forecasts prepared by the company, I would certainly do just that.

Q Okay. Now you do recognize, do you not, Mr. Ender, that increased prices of electricity will demonstrate price elasticity on demand?

MR. PETERSON: I'm going to object to this, Mr. Davis.

HEARINGS EXAMINER: Well, I'm going to sustain the objection unless I understand if it's being used to impeach his statement here, or what the purpose -- I'm lost on that. I want to find out from Mr. Shenker where we are on this line of questioning.

MR. SHENKER: Thank you, Mr. Davis. There are three purposes for the offer of the testimony within the more formal sense of direct testimony and cross-examination. One is with respect to the witness' general credibility as to the consistency of that testimony with others that have been offered.

HEARINGS EXAMINER: Well, as to that my ruling would be that if it pertains to what he's testified to if it's inconsistent, but there's only one way you can compare consistency, and that's what's been testified to here and what's been testified someplace else. I mean, you may be in that field; I don't know.

MR. SHENKER: The second area of our offer is that this witness represents the C. T. Main Company as the man in charge of their system evaluation department from Boston, and one of the assignments given to the C. T. Main Company was initially within this range of preparing evaluations. Now, since we know what the assignment was that they were given, we know what the assignment is that appears as the delimitation in his statement. The reasons for the withdrawal of that assignment, it seems to me, are relevant. Thirdly, if the witness' testimony touches and concerns the issues of vital importance to this hearing, then I believe within the overall ambit of the offer of direct testimony and cross-examination, it's helpful to finding out the facts within the applicants' own offers of evidence. Now that's all within the formal structure. Within the more informal structure of the rules that apply to the hearing in which we are now engaged, if it is the ruling of the Hearing Examiner that I can't ask the questions that I have asked and will continue to ask for a few more minutes, then I would ask that the witness be designated as my witness and his testimony be perpetuated for the purpose of our offer of proof in our own case-in-chief.

HEARINGS EXAMINER: I can appreciate -- go ahead, Mr. Peterson, you want to reply.

MR. PETERSON: Of course, that's what I was just going to object to, Mr. Davis. First of all, the exhibit to which Mr. Shenker referred specifically was made at a meeting in which there were no attorneys present for the Montana Power Company or the applicants in this case, and anything reflected in that meeting is not binding upon the applicants' attorneys' preparations for this hearing, and they certainly can't be binding upon us for the purpose of inquiring of Mr. Ender when the exhibit itself said that that duty, or whatever it was, was withdrawn. Second of all, and more important, counsel is doing just exactly what is forbidden, making this witness, Mr. Ender, his own witness, while the man is here to testify in cross-examination for the purposes of testing the credibility of his testimony and the truth of his testimony on direct, and that goes far afield. And while there are no rules of evidence that apply to these proceedings as such, I suppose that in every instance we could turn around and make everybody else's witness our own and these proceedings will go on interminably. I think that at some time along the line, if Mr. Shenker wants to depose this witness for the purpose of allowing us then to cross-examine this witness under the rules, that's one thing, but to turn around and make him his own witness at this point during cross-examination, to us is not proper.

MR. SHENKER: Well, he's here and in direct examination it's possible to fill whatever cross they wanted to fill, but the important point, it seems to me, is that we're really not here to subvert any facts; if it can be brought out, let's bring them out. We're talking about ten minutes; we're not talking about drawing out the hearings.

MR. PETERSON: Does that go also along with paying this man his fees and expenses and things of that nature? It's just more complicated than that.

MR. SHENKER: Only if you want to make it more complicated than that.

HEARINGS EXAMINER: Well, I'm going to make it a little more complicated. I'm going to make some limitations on it; in other words, I'm going to try to confine this witness' testimony on cross to what we've touched to on direct. I don't want to open up the field on his views on hydroelectric, or solar or nuclear and every other thing that he hasn't testified to because I think that's part of your case-in-chief. But I will permit some limited questions on this thing, but I think you can appreciate my situation on it, too; there's certain limitations I think we ought to observe on the thing.

MR. SHENKER: I would certainly want to abide by the limitations.

HEARINGS EXAMINER: So if you would keep that in mind as you proceed with your questioning, and then you can have a continuing objection, Mr. Peterson, and I'll rule as to if I change my mind or think we'd better stop.

Q I don't suppose you remember the question?

A No, I do not.

Q The question was whether you still adhere to the view that the increased price of electricity will demonstrate price elasticity on demand?

MR. PETERSON: To which I'll object on grounds that it's leading and suggestive.

HEARINGS EXAMINER: Now, is this a view that he had in his deposition, or at a meeting?

MR. SHENKER: At his testimony before the Public Service Commission of South Carolina on February 6, 1975.

HEARINGS EXAMINER: All right, I'll sustain the objection as to that.

MR. SHENKER: I'll offer it to perpetuate the testimony for our case-in-chief.

MR. PETERSON: To which I'll object on grounds that it's an improper offer at this time.

HEARINGS EXAMINER: I'll sustain the objection to that.

MR. SHENKER: Mr. Ender, I guess you're going to miss your 1:30 plane, sir, but I'll have to take your deposition in order to get that testimony perpetuated.

Q The next question, sir, is whether you still adhere to the view that a low load factor maintained by a company puts the screws to the customers?

MR. PETERSON: To which I'll object on the grounds that it's leading and suggestive and beyond the scope of redirect.

HEARINGS EXAMINER: Mr. Shenker, may I ask you if that relates in any way to the direct testimony that's anyplace in this written statement or that you're referring to now?

MR. SHENKER: Well, I think it does relate to the statements by Mr. Ender as to what his capacity is. On page 2 of his statement he refers to the publications of his technical papers. On page 3 he refers to two of those papers by name, the general content of which he has described further for us this morning, and the content happens to cover the area which I am now asking him about.

HEARINGS EXAMINER: All right, he can answer the question then.

A Could you ask the question again, please?

MR. SHENKER: That statement, Mr. Davis, would apply to both of the last questions; shall I go back over both of them or just take this one?

HEARINGS EXAMINER: No, I'm referring to his testimony -- I don't see in his statement anything about his testimony given at the Public Service Commission. I see his periodicals and his references on technical papers, and I assume that's what you're referring to.

Q Consistent with the views you have expressed, Mr. Ender, in the technical publications you have referred to in your statement offered here in this proceeding, do you still adhere to the view that a low load factor maintained by a company is putting the screws to its customers?

MR. PETERSON: Well, I'll object to the form of the question on the ground that there is no evidence in this record to sustain the inquiry that has been propounded by the counsel; it's beyond the scope of any of the evidence which has been presented in the applicants' case-in-chief.

HEARINGS EXAMINER: It's overruled; you can answer if you have that view expressed in any of your technical publications.

A I don't recall ever making a statement like that.

Q I'll show you pages 66 and 67 --

HEARINGS EXAMINER: Of what?

Q -- of the transcript of your testimony before the South Carolina Public Service Commission, starting at line 24, to see if that refreshes your recollection on the answer that you made to the question as to whether you've ever made a statement like that?

(Mr. Shenker shows witness document.)

MR. PETERSON: Are we on cross-examination, Mr. Davis, or are we on direct examination of Mr. Shenker's witness?

MR. SHENKER: I want to know why all of a sudden we've become so formal in a proceeding that has no evidentiary rules, when the answers to the questions would have taken 10 minutes? We've used 15 minutes already in arguing.

MR. PETERSON: I don't know what the answer is. The objection is well noted on the record that I don't believe it's fair for this witness to be brought to the state of Montana by the applicants for the purpose of testifying to the effects of a transmission line, and now we're off on a field of load growths on a hearing that took place in North Carolina, the substance of which is not even before the board.

HEARINGS EXAMINER: Okay. I'm aware of your objection and I'm going to overrule it, but as I say, I'm putting some constraints on it, so you can refresh your memory and answer the question as to that quote.

A I think Mr. Shenker is distorting the comments. The words "putting the screws to their customers" were in the question that was directed to me. I did not use those words.

Q That's true, Mr. Ender, but when the question was asked, you just said, "generally, yes"?

A I said, "generally, yes," but then I had to go on and correct the misconceptions that the questioner had.

Q Yes, you told him about load factor, and that didn't have anything to do with the capacity of your view?

A That's right.

Q All right. But as the question is put to you now, sir, isn't it true that a company with a consistently poor load factor is really in a position that when they overbuild, they are really putting screws to their customers? Your answer to that is generally true, right?

A If, in fact, a utility overbuilt capacity, then they would be putting too much capacity into their system; that is correct.

Q And that puts the screws to their customers, doesn't it?

A Certainly.

Q Now, along the same line, Mr. Ender, consistent with the views that you have expressed in your technical publications referred to in your direct testimony offered in this proceeding, is it still your view that increased prices of electricity will demonstrate price elasticity on demand?

MR. PETERSON: Same objection.

HEARINGS EXAMINER: Same ruling, it's overruled.

You can answer if you have that in your technical publication.

A No, I have nothing on price elasticity in any of my technical publications.

Q Is that your view?

A My knowledge of price elasticity, as I have read the articles published on this subject, is that there is no clear-cut demonstration of price elasticity with respect to increased prices of electricity.

Q No clear-cut, you mean there is an effect which isn't clear-cut?

A The effects that I have seen demonstrated have shown that people in general cut back on their energy usage, but not on their demand when prices of electricity increase.

Q They just cut back on their use?

A Right, which cuts the kilowatt hour usage, but not the demand component of the load.

Q You have to look at that by segregating areas of demand, don't you?

A Yes, you have to look at the classes of customers to do that.

Q All right, Mr. Ender, on some of the tag ends of the transmission line effects, about which you have offered your prepared testimony, would you agree, sir, that it is critical to determine whether the placement of transmission lines is in conformity with local planning objectives?

A Yes, I guess I'd agree with that.

Q Would you agree with the corollary to that that problems with plant siting including transmission lines stem from a lack of comprehensive planning at the beginning?

A Would you read that again, Mr. Shenker?

Q Would you agree, sir, that problems with plant siting, including transmission lines, stem from a lack of comprehensive planning at the beginning?

A I think in a general sense, I would think that the problems show a lack of comprehensive planning on the part of both the utility industry and the regulatory agencies. Many environmental laws have been passed without due regard for their ultimate effects.

Q Did you prepare a benefit-adversity table for the routing of this transmission line?

A I'm sorry, would you repeat that?

Q Did you prepare a benefit adversity table for the routing of this transmission line?

A Benefit-adversity?

Q Yes, sir.

A No, I did not.

Q And I take it that you, on behalf of C. T. Main, did not consider that one of your options in looking at alternative transmission line routes, was to recommend no transmission line at all?

A The alternatives, with regard to the transmission lines, were -- that evaluation was taken before I got into the project.

Q And, indeed, that evaluation was undertaken before C. T. Main got into the project, isn't that true?

A I'm not certain of that.

Q Well, did C. T. Main consider one of its alternatives as recommending no transmission line at all?

A No, we did look at alternatives, but not that alternative.

Q Oh, yes, we talked about the Bonneville Power Administration's survey; how many people were sampled in that survey, do you know?

A I don't remember.

Q Seven, wasn't it?

A I have no idea.

Q Would you agree, sir, that a survey of something around the number of seven would be an inadequate statistical sample?

A It would sound to be like a rather small sample, yes.

Q Are you familiar with Dr. Crider's work from Stanford University?

A I've heard of Dr. Crider; I have not read any of his papers.

Q He works in the field of audible noise, does he not?

A Yes, most of his work, as I understand it, has been in the area of aircraft audible noise.

Q Are you familiar with his finding that within 150 feet of a right-of-way, between 15 and 20 percent of the people who are so located will be annoyed by audible noise levels if they are at 52 decibels?

A No, I'm not aware of that.

Q Are you aware of the phenomenon of workers close to any transmission line with a kV of 242 or above who, in order to communicate with each other, will have to shout?

A Because of the noise from transmission lines?

Q Yes.

A No, I'm not aware of that.

Q Are you not aware of their communicating commonly by walkie-talkies in order to communicate with each other, even though they are within normal hearing distance of each other?

A No, I'm not aware of that.

Q Are you familiar with the work of Drs. Becker and Morino of Syracuse University, of whom Mr. Zobel asked me to ask you about?

A Yes, I am.

Q Are you familiar with Dr. Becker's finding of the electrical field of .15 kilovolts per meter in order to avoid dangers?

A Yes, that should be Becker, by the way. B-E-C-K-E-R.

Q I'm mispronouncing it, I'm sorry. Do you know how much right-of-way would be required to reduce the electrical field to .15 kV per meter?

A No, I don't know precisely the answer to that. I think the proposition of that kind of criteria sort of borders on irresponsibility because the existing distribution circuits, of which there are hundreds of thousands of miles in this country, have fields beneath them greater than .15 kV per meter. In fact, beneath an electric blanket, you can get a field of .25 kV per meter.

Q Do you think that Dr. Becker and Dr. Morino are irresponsible?

A I did not say that. I think that criteria borders on an irresponsible recommendation.

Q What was the reason for their recommendation?

A Presumably they had done some medical research in the fields of field effects on bone growth and things of that sort.

Q And genetic effects?

A Possibly, I don't know that.

Q In the early days of attempts to determine the presence of tubercular conditions in individuals, commonly TB chest X-rays were used without much in the way of insulation. Were the people who suggested that there should be lead shields also irresponsible?

A No. When there are clearly demonstrated harmful effects, I think that there are needs for these controls. We have seen no demonstration of harmful effects due to fields beneath transmission lines.

Q But you do know, don't you, Mr. Ender, of studies that have shown the decreased production of chickens as a result of electrical fields of 1.5 kV?

A Yes. Now, I think the reports of studies like that need to be carefully evaluated by researchers who are competent in those same fields, and I think you need to seek out the opinions of other researchers to evaluate those effects. The experimental protocol that surrounds studies like that is very important.

Q Do you think that Dr. Kruger from the New York Academy of Science did a good job?

A I don't know. I have not examined the experiments that he conducted.

Q I suppose you still adhere to the view, Mr. Ender, that I believe that I discussed with you on your deposition, that the effect of ozone on humans is not a concern of yours from transmission lines?

A I have examined some of the published literature on ozone production and the attempts to measure ozone produced by transmission lines, on the ground beneath the lines, and the overwhelming conclusion of this literature is that there are no measurable additions to the ambient ozone levels by a transmission line.

Q You don't want us to believe that there are no studies which show that there are measurable ozone effluents from transmission lines?

A No, everyone agrees that corona on transmission lines can produce ozone, but what these studies have attempted to measure are the levels of ozone at ground levels in the vicinity of transmission lines, and these studies by Battell Memorial Institute, American Electric Power Corporation, Illinois Institute of Technology, have all indicated that, based on the metering techniques available, that we're talking about ozone levels beneath the transmission line of the order of 1/100th of the ambient levels, ozone which is produced by nature itself.

Q Do you know what the standard is for ozone as set nationally?

A Yes, I believe I have it here somewhere. I believe it's 80 parts per billion, or something of that sort, set by the American Environmental Protection Act.

Q .08 parts per million or 80 parts per billion, yes.

A That's right.

Q Do you know that the Environmental Protection Agency and the Oak Ridge National Laboratory both have measured ozone in high elevations, that is in excess of 5000 feet, that are in excess of the standard of .08 parts per million under transmission lines?

A No, I'm not aware of that. Is that a published report?

Q Oak Ridge National Laboratory, yes. You have not examined their reports?

A No, I have not.

MR. SHENKER: Nothing further. Thank you.

MR. PETERSON: May I have a few minutes?

HEARINGS EXAMINER: Yes, you may. Let's take a brief recess first.

(RECESS AT 12:30 P.M.)

Following a brief recess, the hearing reconvened at 12:45 P.M. on February 11, 1976.

CONTINUATION OF EXAMINATION OF ROBERT C. ENDER

Redirect, by Applicants

By Mr. Peterson:

Q First of all, Mr. Ender, you made the statement that as one leaves the right-of-way the audible noise extenuates rapidly; what do you mean by that?

A I didn't mean to say extenuates; I meant to say attenuates, and by that I mean it decreases rapidly.

Q All right. And also during your cross-examination I believe you made the statement that the fence under the transmission line can be a problem; how will that be taken care of for Colstrip 1 and 2?

A All right. We have made a recommendation to the Colstrip owners that all fences beneath the right-of-way be grounded every 100 feet or less, and we made some other recommendations with regard to fences crossing the right-of-way, and so forth. Now, if these grounding practices are followed, there will be no problems with the fences beneath the transmission line.

Q With regard to the electrostatic and electromagnetic effects of field under extra high voltage lines, first of all, do you know how many miles of reported EHV lines there are constructed in the world?

A We've researched the total EHV transmission line construction in the world and at the EHV levels which I defined earlier in my testimony, there are in existence approximately 65,000 circuit miles of EHV transmission in the world. Of this 65,000, approximately 25,000 is at the 500 kV level. The rest are at 765 and lower voltage levels, down to 300.

Q And have there been any reported adverse effects on humans from these lines?

A Again, we know of no adverse or harmful effects to plant or animal or human life beneath the transmission lines.

Q And that has been the experience?

A And that has been the experience.

Q Now, with regard to audible noise beneath the transmission lines, have you had any personal experience with witnessing audible noise under a transmission line?

A Yes, on several occasions I have been in the vicinity of transmission lines in the proper weather conditions. Audible noise phenomenon on EHV lines is only a foul weather phenomenon.

Q What do you mean by foul weather?

A Well, the conductor has to be wet in order to produce audible noise. Under dry conditions you don't hear the transmission lines at all. Now, one particular experience I had was in July of 1974 at the Bonneville Power Administration at their Ostrander test facility near Portland, Oregon. In that case it was a mildly foggy day, a very humid day, and you could hear the transmission line crackling and hissing due to the corona on the line.

Q Did it affect your hearing of anyone speaking to you?

A No, I was standing directly beneath the line and I had no trouble at all communicating with people 40 and 50 feet away.

Q Did you have to shout?

A I didn't have to raise my voice above what I normally would have had to.

Q Now, with regard to the Becker-Morino statements, or testimony that they gave at the New York hearings, do you agree with their findings or recommendations?

A Well, as I tried to indicate in my response to Mr. Shenker's questions, I do not believe the proposed criteria of .15 kV per meter is a reasonable criteria.

Q What would be the effect of adopting that criteria?

A In my opinion, it would mean that we could not build any more distribution or transmission lines in this country if that were imposed. In fact, you'll find that these field strengths exist in the home situation.

Q So you if you get that field strength in the home situation, what would that mean to the homemaker if that were the criteria?

A It's a question of whether you could backtrack and impose this kind of requirement. It probably means that you would have to eliminate the use of electricity in the home.

MR. PETERSON: I have nothing further.

HEARINGS EXAMINER: Mr. Shenker.

Re-cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Now, it's not true that the only alternative to the criteria in that .15 kV is not to do any more building and not to use any more electricity. There are, of course, steps that can be taken in order to guard against the dangers that come from such field effects?

A I do not believe there are any practical steps that could be taken to limit fields to that value.

Q No, indeed, there are no steps now known because no one has recognized that as the kind of danger which suggests that steps be taken. But that's true, is it not, as a general phenomenon whenever problems are encountered, the remedy for the problem has to be found?

A We don't know that there's a problem.

Q Well, if you don't know that there's a problem, you can't tell me there's no remedy for the problem you don't know about, is there?

A See, you were citing the material given in evidence in the New York State Public Service Commission hearings by Drs. Morino and Becker. Now, those hearings will include evidence prepared by other witnesses in the medical and biological and other scientific areas that will refute that testimony, I'm sure.

Q Indeed, some of that testimony is prepared by the C. T. Main Company isn't it?

A No, not in the biological area; we have not prepared any testimony.

Q But you are appearing in the New York Public Service Commission hearings; are you not?

A Yes.

Q And on whose behalf did Drs. Morino and Becker testify in those hearings?

A I'm not certain; I think they might have appeared on behalf of the New York State Department of Environmental Conservation.

Q Before whom was the hearing being conducted?

A New York State Public Service Commission.

Q And Drs. Becker and Morino were called as witnesses by the staff of the New York State Public Service Commission, were they not?

A I'm not certain of that; I thought it was the Department of Environmental Conservation.

Q The New York State agency?

A Yes. There are two state agencies involved.

Q Now, Mr. Ender, you mentioned that one of your recommendations is to ground fences at least every 100 feet. You do that, I take it because if you don't there's going to be some kind of a problem?

A There might be a problem.

Q What's the problem?

A The problem with fences is that if you have a fence, let's say an ungrounded fence of 1000 feet long at the right position parallel to the line, you might get currents in excess of what we've used as a criteria here, which is the 5 milliampere let-go level which is an industry-designed criteria which is generally used.

Q And if you have currents of that excess level, then what's the problem from that?

A Well, the problem is that on a statistical basis you may be getting into the area where people may have difficulty in letting go of the line, so if you follow these recommended grounding practices there should be no problems.

Q But the problem that you are talking about is a problem that would have effect upon humans and animals unless there were grounding; is that right?

A Yes.

Q Okay. Now you told Mr. Peterson of the research you have done on the numbers of miles of circuits of EHV lines; have you done research on the numbers of complaints from folks who believe that they have had problems as a result of radio interference, television interference, audible noise, or other effects upon them, their animals or their property?

A No, I have not done any research personally in that area. I've read the reports of such research done by others.

Q What are the numbers of complaints that have been heard?

A Generally the complaints have been very minor. I think you'll find that in the whole EHV transmission line area, the general public has a relatively favorable view of transmission lines. I've seen statements by some people that these can be called super safe superhighways, and in that sense they are -- for example, if you compared them with traffic fatalities in this country, of which we have 50,000 per year on the average, we have no record of fatalities due to people using the right-of-way area in normal use.

Q How many complaints, Mr. Ender?

A I don't know how many complaints because as I told you I haven't done these studies myself.

Q I know, but you've read the literature; how many complaints have been reported in the literature?

A I don't remember.

Q Are you familiar with the study done by William Law on the subject of effects of EHV transmission line radiation on television and broadcast band methods for predicting interference levels?

A William Law?

Q L-A-W.

A No, I'm not familiar with him.

Q In his study, which is a matter of record in this proceeding, people did not refer to the EHV lines as super safe highways; they referred to them as "nuisances causing problems and interference with their way of life." Some of the specific language was that "it took away from the source of entertainment and information"; have you heard that?

A No, I haven't. I've seen other studies which have been based on surveys conducted of people who live adjacent to 765 kV lines, and they have shown very favorable opinions by those people on the lines.

Q Have you caused any survey to be done of the folks in Montana to see what their reactions would be?

A No, I have not.

MR. SHENKER: Nothing further. Thank you.

MR. PETERSON: Mr. Davis, I just have one question which I overlooked.

Re-redirect, by Applicants

By Mr. Peterson:

Q Mr. Ender, with regard to the Zobel Exhibit, Deposition Exhibit number 13, a copy of the minutes of the February 6 and 7, 1975 meeting held at Charlotte, in the examination of those minutes, were there any attorneys present at that meeting?

A I was not present at that meeting, but I do not believe any attorneys were present.

MR. PETERSON: That's all I have.

HEARING EXAMINER: Anything further? Very well, you may be excused, sir.

(WITNESS EXCUSED)

(RECESS AT 1:00 P.M.)

Following the luncheon recess, the hearing reconvened at 2:20 P.M. on February 11, 1976.

HEARINGS EXAMINER: You may go ahead, Mr. Shenker.

GEORGE HAROLD BRIGGS, appearing as a public witness, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

(THE WRITTEN DIRECT TESTIMONY OF MR. GEORGE HAROLD BRIGGS WAS DIRECTED TO BE INSERTED AT THIS POINT.)

VIGILANTE ELECTRIC COOPERATIVE INC.

225 E. BANNACK STREET • PHONE 683-2327 • DILLON, MONTANA 59725

February 10, 1976

Presented By: George Harold Briggs Dell, Montana 59724

My name is George Harold Briggs (most people call me Harold). I am the President of our Ranch Corporation located in Beaverhead County. I am also a member of the Board of Directors of Vigilante Electric Coop, and have served in this capacity for more than twenty years. Montana Power supplied our wholesale power until the Bonneville Power Administration included us in their service area, and then we still have to rely on Montana Power to wheel the power to our points of distribution.

Our ranch is now using 850 H.P. for irrigation and there is a study being made now that would add an additional 2,500 H.P. to this. Prior to the time we had enough electricity, we never had enough hay. Our plans to expand our use of electricity for increased hay production will allow us to feed our cattle longer and increase our numbers, making our ranch a more economical unit.

It seems so strange to me that we are doing very little to alleviate an energy crisis. We hear the term environmental impact and right there the brake is applied. No one loves our country more than I do and my life is evidence of rural living. Can you think of a worse environment than this nation suddenly finding its people without food, heat and power, just because we are prohibited from using a natural resource that would supply this energy and at the same time broaden our tax base and provide millions of dollars in revenue to a state that has imposed one of the heaviest property tax burdens on its people?

It seems to me that an environment of this nature is far worse than disturbing our landscape, which, when it is reclaimed, looks better afterward than it did before. If we are to deal effectively and realistically with the energy crisis, we must sharply reduce our excessive dependence on oil and gas by shifting to sources that are more plentiful. The fuels I refer to are uranium and coal. For most purposes, these fuels have to be converted to electricity. All the energy sources that might replace oil and gas must be converted to electricity. It seems to me if we relieve our energy shortage we have to increase our use of electricity in the years ahead. It seems to me that we have legislated our standard to insure protection to our people. Now, to deny Montana Power the right to comply with these standards, seems undemocratic to me. Philip N. Ross, who is Manager of Power Systems Planning for Westinghouse, sums it up in a manner that is in accord with my thinking. He says only two energy sources are now available--coal and uranium. The electric economy is an absolute corollary of using coal and uranium. Even later, if we find a way to use fusion or solar energy, or geothermal energy, or tidal energy, or the wind, electricity is the only way to put these sources to work.

This is a challenge--we must begin now to develop the electric energy economy as the answer to our limited supplies and finite reserves of oil and gas. We should henceforth measure all decisions by the standard of whether they help or hinder the achievement of this new energy system.

Recognition of the dominant roles that electricity, nuclear fuels and coal will play in meeting our future energy needs, should be the crux of our national energy policy. The time is short and the matter is of the utmost urgency. It demands a national commitment akin to that which put men on the moon.

As a rancher I have concluded that the only two things that haven't kept pace with inflation are live beef prices and the cost of electricity. I also feel that it is the sufficiency of each that has kept the prices low. In conclusion, I am just a rancher at Dell, Montana, but I realize that my life has been greatly enhanced by this electrical age, and I feel that if our continuous demand for electric energy breaks down, it will serve those that oppose Coal Strip #3 and #4 just as adversely as we who support it.

I thank you for your kind attention.

EXAMINATION OF GEORGE HAROLD BRIGGS

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Mr. Briggs, in your statement you say most people call me Harold; can I call you Harold?

A That's right.

Q Are you authorized to speak here on behalf of the Vigilante Electric Coop?

A I am.

Q Did they make that determination recently, or is that a long time ago they made that decision?

A It was made recently.

Q Now you are also testifying, as I gather from your statement, in your own private capacity as a rancher in the Dillon area?

A That's right.

Q As I understand your written statment, Harold, there are about four points that I think I wanted to chat with you about. The first point that you make is that it's important to do something to alleviate an energy crisis in which we find ourselves, right?

A That is correct.

Q Yes. Now Colstrip 3 and 4, of course, is not the only solution to an energy crisis; it's part of an aspect of the whole problem that you want to look at, right?

A That is right.

Q You wouldn't want to go ahead with Colstrip 3 and 4 unless that was the best way to help solve the energy crisis; isn't that right?

A Would you state that question again; I missed that question.

Q Sure, you wouldn't want to go ahead with Colstrip 3 and 4 unless that were one of the best ways to solve the energy crisis?

A Well, perhaps maybe the best ways wouldn't be sufficient to solve the energy crisis. If there were better ways to solve the energy crisis, then perhaps yes.

Q Okay, good. Now you make an interesting comment on the second page of your statement, Harold, if you want to take that out there. It's about in the middle of the first main big paragraph on that page when you say that we have legislated our standard to insure the protection to our people. Do you mean the Utility Siting Act legislation itself; is that what you had in mind?

A And I'm referring to the safeguards the state has put in there in reference to environmental.

Q Oh, I see. Well, let me ask you about this piece of legislation. The Montana Utility Siting Act is the overall kind of legislation that brings us here to this hearing, and it speaks to such questions as the need for the facilities, the alternatives that should be considered, the economics, technology, and environmental things, too. Now you believe that that's a pretty good idea, don't you, that folks who apply for a certificate to build their plants should be judged on the basis of the guidelines that have been set up by the legislature?

A That's right.

Q And you would believe that folks who make that kind of application should be not only judged by those guidelines, but held to those standards; wouldn't you?

A That would be the law.

Q And you are in favor of that, aren't you?

A I don't understand the laws, not all of them, enough to make that broad a statement; but I believe in obeying the law.

Q Okay, as far as you understand the law including the Siting Act, you think that something ought to be obeyed; don't you?

A Yes.

Q Good. You also make the point in the last page of your statement, if you want to turn to that. This is at the top of page 3 that we should henceforth measure all decisions by the standard of whether they help or hinder the achievement of a new energy system. Now I take it that new energy system you're talking about is the reference in the previous sentence there where you say that the energy economy is going to have to be an answer to our limited supplies and finite reserves of oil and gas?

A That is right.

Q Sure. You don't have any particular preference, do you, Harold, as to what the source is for the energy that is produced?

A Only my -- the information that I would have for a question like that is I realize that the fossil fuels are being depleted very rapidly, and from all indication that I know of, they'll be, at our present rate of use, they'll be exhausted by the end of the century. So, for that reason, I'm concerned in the type of fuel we use.

Q Sure. And it's important if you're going to exhaust your fuels to make sure that you use them wisely in the process?

A That is correct.

Q Good. The last point that I wanted to ask you about is in the beginning of the last paragraph of your statement. You said you concluded that the only two things that haven't kept pace with inflation are live beef prices and the cost of electricity; and it's your fortune, or misfortune, to be with a couple of folks that deal with both of those; isn't that right? Now you know that the cost of electricity is going up, though, don't you?

A That is correct.

Q And as the price of electricity goes up, do you think that that may have some effect upon the use of electricity?

A Not making a study of that -- I just came from a meeting in Los Angeles at the National Rural Electrification, and they stated there that our wholesale cost of power was substantially going up. We'd probably go to a wholesale cost of $.04 per kilowatt.

Q That's up how much, Harold?

A Oh, we're selling power at 6 mills, we're pumping, plus a $6.00 horsepower charge. So it's considerably high. That's a difficult question to answer because everything, it seems like to me, is half hay wire anyway.

Q But, I suppose, sitting as a board member of the Vigilante Electric Coop, you'd like all the help you could get in trying to answer that question, wouldn't you?

A That is right.

Q Good. Thanks very much for being here today, sir. I have nothing further.

HEARINGS EXAMINER: Thank you, Mr. Briggs, for your attendance, and that's all you need. You're statement will go in the record and be in evidence in this hearing.

WITNESS: Thank you, Carl, very much.

(WITNESS EXCUSED)

HEARINGS EXAMINER: Next witness?

ROBERT E. MOGEN, appearing as a public witness, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

(THE WRITTEN DIRECT TESTIMONY OF MR. ROBERT E. MOGEN WAS DIRECTED TO BE INSERTED AT THIS POINT.)

STATEMENT OF TESTIMONY OF ROBERT E. MOGEN

My name is Robert E. Mogen and I live in Forsyth, Montana. I am 58 years of age and am employed as a County Appraiser for Rosebud County. I have held this position since 1968. I have lived in Forsyth since 1938 and during my residence in Forsyth and until my appointment as County Appraiser I operated various businesses of my own.

Applicants' Exhibits numbered 223, 224, 225 and 226 have been prepared by Charles Gilder, an employee of The Montana Power Company. I have checked these Exhibits and find them true and correct.

Applicants' Exhibit No. 223 titled "Total Rosebud County Taxable Values" gives a breakdown by classes of the total taxable values of property in Rosebud County for the years from 1970 to 1975. The catagory of "Public Utilities" includes property owned by The Montana Power Company, Montana-Dakota Utilities Co., Burlington Northern, Inc. and all other utilities locally assessed. The 1975 taxable value as to public utilities in Exhibit 223 is $13,829,262.00 and footnote (1) indicates that of this amount Colstrip Units 1 and 2 carry a taxable value of $13,504,625.00. The 1974 taxable value as to public utilities in Exhibit 223 is $3,671,729.00 and footnote (2) indicates that of this amount Colstrip Units 1 and 2 carry a taxable value of $3,471,059.00. The 1973 taxable value as to public utilities in Exhibit 223 is $428,493.00 and footnote (3) indicates that of this amount Colstrip Units 1 and 2 carry a taxable value of $278,180.00. Colstrip generating Units 1 and 2 were not assessed for the year 1972 and previous years because of their commencement dates. Of interest in Exhibit 223 is the fact that in the year 1970 taxable values as to public utilities carried 1% of the total county load; this has now increased so that during the year of 1975 the taxable values as to these public utilities amounted to 32% of the total.

Applicants' Exhibit No. 224 titled "School District No. 19 Taxable Value Comparisons" sets forth in the upper half of the Exhibit the total taxable value of property in elementary and high school districts No. 19, the taxable value of properties owned by The Montana Power Company, Puget Sound Power & Light Co. and Western Energy Company in the school districts and the percentage of the total taxable value of property owned by these companies. Included in the taxable value of these companies are Units 1 and 2 owned by Montana Power and Puget Sound Power and mining machinery and equipment and the Townsite of Colstrip owned by Western Energy. Also included in the Exhibit in the lower half are taxable value figures covering all coal related activities. These figures include not only all of the figures in the upper portion of the Exhibit as described above but also net proceeds from the Burlington Northern, Inc. and properties of Peabody Coal Company. Figures for the years 1974 and 1975 only are given because prior to this time Colstrip Units 1 and 2 were not assessed for taxation with the exception of the comparatively small amount of $278,180.00 in 1973.

Exhibit No. 224 illustrates that in 1975 the taxable value of properties owned by Montana Power, Puget Sound Power and Western Energy in Colstrip elementary school district No. 19

represented 76.7% ($17,181,327.00) of all the taxable valuation in the elementary school district ($22,393,341.00). This represents an increase of 14.9% over the 1974 utilities' percentage of 61.8%. The 1975 taxable value of properties owned by Montana Power, Puget Sound Power and Western Energy in Colstrip high school district No. 19 represented 71.1% ($17,181,327.00) of all the taxable valuation in the high school district ($24,181,043.00). This represents an increase of 18.1% over the 1974 utilities' percentage of 53%.

Exhibit No. 224 further illustrates that the 1975 taxable value of all coal related activities in Colstrip elementary school district No. 19 represented 89.8% ($20,104,123.00) of all the taxable valuation in the elementary school district ($22,393,341.00). This represents an increase of 8.1% over the comparative figures for 1974. The 1975 taxable value of all coal related activities in Colstrip high school district No. 19 represented 83.1% ($20,104,123.00) of all the taxable valuation in the high school district ($24,181,043.00). This represents an increase of 13% over the comparative figures for 1974.

Applicants' Exhibit No. 225 titled "Rosebud County Property Tax Data" tabulates in the first two columns the total taxable values and the total property taxes assessed in Rosebud County for the years 1970 to 1975. The second group of figures gives the taxable value of property owned by Montana Power, Puget Sound Power and Western Energy in the county as well as the percentages of the total taxable value of property owned by these companies. The third group of figures gives the property taxes paid by these companies and their percentage share of the total taxes.

Included in the property owned by these companies are Colstrip Units 1 and 2, mining machinery and equipment and the Townsite of Colstrip. Exhibit 225 shows that the taxable value of these companies' property in 1970 was 5% of the county total and that this figure has increased steadily until it equaled 40% of the total in 1975. As to total property taxes paid in Rosebud County, the Exhibit indicates that commencing in 1970 these companies paid 5% which increased to 35% in 1975. In addition, in 1975 a portion of Western Energy's coal severance tax was paid to Rosebud County in the amount of $173,149.00. This figure was not included in Exhibit 225 and will undoubtedly increase in future years.

Applicants' Exhibit No. 226 titled "Mill Levy Comparisons" gives the total mill levies and the various categories making up the same for the years of 1970 through 1975 for both Colstrip School District No. 19 and the City of Forsyth School District No. 4. The mill levy for the Colstrip School District No. 19 has decreased from 137 mills in 1970 to 98 mills in 1975 whereas the mill levy for the City of Forsyth School District No. 4 has varied from year to year with the 1975 levy being almost identical with the 1970 levy.

EXAMINATION OF ROBERT E. MOGEN

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Mr. Mogen, your statement tells us that you have been the county appraiser for Rosebud County since 1968?

A That's true.

Q Well, then you've been over in Rosebud County as the county appraiser even before the Montana Power Company arrived with the other folks who are partners to develop the Colstrip area?

A Yes.

Q When did you first have any contact from the Montana Power Company about its plans to come into Rosebud County?

A I don't know whether I could put a date on it, but it was probably in '70 there, about 1970 mostly when they started.

Q When the representatives of the power company, or the Western Energy Company as it later came to be known, first made any contact with you, sir, did you discuss with them the need that you would have to plan properly for the development of your appraising techniques in Rosebud County?

A No, no, I don't think so. We had pretty much of an established system. There already was -- basically the equipment was there.

Q Let me just ask you this general question, Mr. Mogen. Have you taken any special steps to equip your department with additional appraisers or with additional equipment or with additional know how of some kind in order to plan for the impact of the development of Colstrip?

A No.

Q Now I notice in your statement that you referred to some exhibits that have been prepared by Charles Gilder. Are you familiar with Chuck Gilder?

A Yes.

Q How does it happen that he prepared these statements for you, sir?

A He made them for me to come up here and testify in their behalf?

Q Well, why didn't you make your own?

A Because I wasn't interested in coming up until I was subpoenaed.

Q So you told him if you want me to come up and testify, you better prepare the material?

A That's right.

Q And he said okay?

A Yes.

Q So I take it that you yourself did not actually check out your records to prepare these materials, but you've looked them over and they look about right?

A They are right. The things that can be checked are checked there, and I'd say that they are all in order as far as I can see.

Q Now the year 1975-'76 is a fiscal year in Rosebud County, isn't it?

A Yes.

Q When does that year start?

A The first of July in '75.

Q Do these years as they appear on your exhibits attached to your statement refer to fiscal years or do they refer to calender years.

A No, they're fiscal years.

Q So the year 1975 up there should refer to the fiscal year July 1, 1975 to June 30, 1976.

A Yes.

Q Do you have any new mill levies that are going to be imposed in Rosebud County in the next year?

A Not that I know of.

Q Have you had any bond issues that have been approved by the voters of Rosebud County?

A I think the school there has, yes.

Q Yes; is that included in these figures?

A Well, now on which exhibit are you on?

Q On Exhibit number 224, that's called School District Number 19?

A Two hundred twenty-four?

Q Yes. Is the new school bond issue on there?

A Now that's in School District 19 here?

Q Yes, sir.

A Yes, I think it is.

Q Good. Where does that appear?

A Well, it doesn't appear on anything on this sheet, this here is only a taxable value comparison.

Q Oh, I see. Well, let's take a look at this thing you call Mill Levy Comparisons, Years 1970-'75, Exhibit number 226. Are the school district new levies on that sheet?

A Yes, I think they are.

Q Good. Where are they?

A They would be in the elementary and high school down on the -- next to the last two lines.

Q Do you think that the mill levy for the fiscal year '75-'76 for School District 19 is going to be 9.2 and 8.94, respectively, for the elementary and high school?

A Yes.

Q Okay, sir. Now if you'll look at Exhibit number 223, it's called Total Rosebud County Taxable Values?

A Yes.

Q Does the 1975 figure that appears on there include the value of Colstrip unit number 2?

A Yes.

Q What is that value alone; do you know?

A Yes, the taxable value of Colstrip number 1 and 2 in 1975 is $13,504,625.00.

Q Well, that's for units 1 and 2 together. I asked you about unit number 2 alone?

A Well, I can answer that, but I'll have to look it up because I don't remember.

Q Okay.

(Witness searching records)

A Number 2 is $1,100,944.00.

Q Yes, and what is number 1?

A It is $12,382,686.00.

Q Now the last thing I wanted to ask you about, Mr. Mogen, if you'd turn back to that Exhibit number 224, that's School District Number 19 Taxable Value Comparisons, and that shows Montana Power, Puget Sound Power and Western Energy. Can you break those down for me among the three?

A Yes; I might not be able to break them quite as much as you would like because their valuations are composed of many things.

Q Yes.

A But I can give you these ones.

Q Can you give me a Western Energy figure by itself?

A Yes.

Q Good; what's that?

A The total taxable for '75 for Western Energy is $3,274,850.00.

Q Okay, and then if you drop down on that same sheet in the same column it says, "All coal related activities."

A Yes.

Q And there is a difference of about $3,000,000.00 between the top and the bottom there. What's the other $3,000,000.00?

A The other $3,000,000.00 is another coal mine that would create coal mining activity. That would be Peabody and the net proceeds from Burlington Northern Railroad.

MR. SHENKER: Good. That's all I wanted to know, Mr. Mogen. Thank you very much, sir.

HEARINGS EXAMINER: Cross?

MR. BELLINGHAM: I did not get the total figures for 1 and 2 for the year '75.

MR. SHENKER: They are on the exhibit.

MR. BELLINGHAM: No, I mean for each individual one.

MR. SHENKER: Oh, each individual?

MR. BELLINGHAM: Right. It was $12,382,686.00 for number 1.

WITNESS: Let me see if I can find that again. I don't have a very good notebook here. Plant number 1 is $12,382, 686.00.

Cross, by Applicants

By Mr. Bellingham:

Q And number 2?

A And number 2 is $1,100,944.00. Now another thing that you might find in adding them is that you have project lands that belong to both of those power companies of a minor amount of $1,053 tax, and you have project lands, $15,906.00.

Q Well, the reason I'm asking this is because I didn't think that added up to the total.

A Well, that's what I was talking about. Then there's two trailers.

Q And so when you add those additional items, they do come up to the total?

A They come to $13,502,645.00.

Q You've got at the bottom of Exhibit 223, $13,504,625.00, at the bottom of 223.

A Well, $2,000.00 in taxable value out of $13,000,000.00; I don't know --

Q Could it possibly be miscellaneous lands, Mr. Mogen?

A Well, that's what I'm thinking. Some land is bought out there that isn't in the name of the power company, but they have paid the taxes on it because it's in escrow which could amount to a little bit there, but that's --

Q Now then, turning your attention to Forsyth, do you have any comparison as far as population, cities in the state 1,000 to 2,000, and we're talking about incorporated cities, where Forsyth stands as far as total mill levies are concerned?

A Yes, the Montana property tax mill levies here, as put out by the Montana Taxpayers Association, illustrated that, and I noticed the other day that there were some facts in here.

Q How many cities are included in that?

A Well, I think 27, and they are with population under 1,000, I mean over 1,000 and under 2,000.

Q Now Forsyth would be included in that?

A Forsyth is one of them.

Q What do those statistics show?

A In the year of '75 and '76, the total mill levy in Forsyth is .17558.

Q Now where does that stand?

A Now that in standing here is next to the lowest mill levy of any city in that category.

Q That would place Forsyth in the 26th position?

A Yes.

Q What about the previous year?

A The previous year they were the lowest in that category.

Q That year would be '74-'75?

A Yes.

Q And what is the mill levy?

A That was 167888.

MR. BELLINGHAM: No further questions.

Re-cross by Department of Natural Resources and Conservation

By Mr. Shenker:

Q I'm just kind of curious, Mr. Mogen; what's project lands?

A Project lands is merely a name, I guess, for the lands. It's lands that they have bought for future expansion is about the way that I would -- and for trading.

Q Okay, thanks.

HEARINGS EXAMINER: Nothing further; very well, you're excused. Thank you, sir.

(WITNESS EXCUSED)

MR. BELLINGHAM: The applicants, at this time, offer into evidence Exhibits 223, 224, 225, and 226.

MR. SHENKER: With thanks to Mr. Gilder, we have no objection.

HEARINGS EXAMINER: Those exhibits will be admitted. Now I don't think I ruled on the exhibits by Mr. Ender.

MR. SHENKER: Were there some new exhibits?

HEARINGS EXAMINER: Yes, Exhibits 91, 91-A, B, C, D, E, and F.

MR. SHENKER: Oh, Jack offered those. I have no objection.

HEARINGS EXAMINER: They were offered and they will be received in evidence, and objections to 95-A, B, and C that Mr. Graybill made for the record on Mr. Zobel's exhibits will be denied, and those exhibits will be admitted in record, just to complete the record in case we overlook that.

MR. SHENKER: I think I have no objections to those exhibits. While we are making the record complete. By the way, I'd like the record to show that Mr. Mogen's statement of testimony on behalf of the applicants was received by me on February 8.

HEARINGS EXAMINER: Very well, it will so show. You've got a couple others received, I think, too, haven't you?

MR. SHENKER: Mr. Labrie and Mr. Woodley, yes.

HEARINGS EXAMINER: Are there any other witnesses scheduled at this time? We will have a brief recess then.

(RECESS AT 2:45 P.M.)

Following a brief recess, the hearing reconvened at 3:05 P.M. on February 11, 1976.

HEARINGS EXAMINER: We will be back in session.

FRANK DUNKLE, called as a witness by the Applicants, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

MR. BELLINGHAM: Mr. Hearings Examiner, I do have a couple of documents here that were previously requested, and I'd like, while I have them on hand, I'd like to turn them over to the opposition if I might?

HEARINGS EXAMINER: Very well.

MR. BELLINGHAM: First of all, during the course of

Mr. Hofacker's testimony, a request was made concerning a letter of some kind, or an agreement, with Anaconda regarding the Anaconda Company's load, and I might say that I am turning over at this time a letter of agreement dated December 23, 1975, which evidences the latest draft of any kind of an agreement between them. That would be Montana Power and the Anaconda Company. However, it is my understanding that this is still in the process of being negotiated and it may not be the final one. Also, it was previously requested by Mr. Graybill during the course of the testimony of Dave Knight of Puget Sound Power and Light that the latest agreement between Puget and Montana Power relative to the transmission line be turned over. And here, again, I might state that I am handing the attorneys for the opposing parties what has been marked a 13th draft agreement dated October 27, 1975. It is my understanding that this is a draft only and has not been executed and may be subject to further changes. That concludes the documents that I am turning over at this time.

HEARINGS EXAMINER: And you have some exhibits that go with Mr. Dunkle's testimony, Mr. Peterson?

MR. PETERSON: Yes, Mr. Davis, I'll move into evidence Applicants Exhibits 77-A, 77-B, 77-C, and 77-D.

HEARINGS EXAMINER: Very well; you may cross examine Mr. Shenker.

(THE WRITTEN DIRECT TESTIMONY OF MR. FRANK DUNKLE WAS DIRECTED TO BE INSERTED AT THIS POINT.)

SUPPLEMENTAL TESTIMONY OF FRANK DUNKLE

My name is Frank Dunkle and I have previously testified in this proceeding.

The Montana Power Company contracted with Ecological Consulting Service of Helena, Montana for a wildlife and wildlife habitat study of mining areas A, B, D and E in August of 1972. In January of 1973 the study area was expanded to 200 square miles, in the shape of a rectangle 20 miles long and 10 miles wide, centered on Colstrip, with the long axis oriented northwest-southeast. This study area is called the Colstrip 10x20. Wildlife data is collected somewhat outside the perimeter of the 10x20.

A baseline for wildlife and wildlife habitat was obtained for the area in 1973. Revised Applicants' Exhibits 77 A and B. The 10x20 was monitored on a substantial basis in 1974, 1975 and is being monitored in 1976. Studies for 1974 is Applicants' Exhibit 77C and for 1975 is Applicants' Exhibit 77D.

The vegetation habitat types were mapped on the 10x20 in 1973, and wildlife observations are correlated to the use of habitat seasonally by the various species. The annual reports resulting from these studies have been utilized by Western Energy Company to fulfill the wildlife requirements of the Montana Strip Mining and Reclamation Act and regulations promulgated thereunder, in their applications for mining permits under the Act. The Montana Department of State Lands has made the studies widely available to agencies for comment under the provisions of the Montana Environmental Policy Act. In four years there have been no adverse comments. The studies have been recognized as competent professional work. Biologists of the Montana Department of Fish and Game, State Lands and federal agencies have periodically spent days in the field with ECS biologists for familiarization with the area and to observe methods and techniques.

Summary comments concerning Exhibits 77 A, B, C and D, which are elaborated in detail in the studies, are:

Mule deer are the most common big game animals on the 10x20. In 1975, 1,112 mule deer were seen in 304 observations. The 1973 total was 657 and in 1974, 1,151.

Mule deer predominantly use grasslands containing big sage, silver sage and skunkbush in spring, creek bottoms and hay-croplands in summer, creek bottoms in fall, and ponderosa pine grasslands and juniper types in winter. No change in the seasonal distribution of mule deer has been detected from year to year.

Mule deer productivity on the 10x20 increased considerably from 1973 to 1974, and increased somewhat from 1974 to 1975. The fawn:doe ratio for fall, 1973, was 59 fawns per 100 does. In 1974 it was 68 fawns per 100 does. In 1975 it was 72 fawns per 100 does.

The fall fawn:adult ratios were 40 fawns per 100 adults in 1973, 55 fawns per 100 adults in 1974 and 62 fawns per 100 adults in 1975. Both fawn:doe and fawn:adult ratios substantiate a yearly increase in mule deer productivity for the last 3 years. A succession of relatively mild winters and adequate good habitat is no doubt a factor.

Browse transects do not reveal overuse during winter by deer. The minimum deer population estimate for the 10x20 for the last two years averages 1 deer per square mile, based on complete aerial coverage of the area. During the course of a year a minimum of 163 to 238 individual mule deer have been using the 10x20.

In 1973, 5 white-tailed deer were observed on the 10x20. In 1974, 6 were observed, and in 1975, 16 observations of 36 whitetails were made. With a single exception, all whitetail observations were made along Rosebud Creek. White-tailed deer appear to be increasing in several Montana areas, and the increasing number of observations of whitetails on the 10x20 indicates they are also increasing in the Colstrip area.

The 10x20 is marginal pronghorn antelope habitat, and low productivity is normal for a species living in that type of an area. Large expanses of sagebrush-grasslands are necessary for antelope and these are lacking on the 10x20. In 1973 and 1974, the fawn:doe ratio was 40 fawns per 100 does. In 1975, it was 20 fawns per 100 does. No seasonal changes in the distribution of antelope has been detected. In 1975, 234 individual pronghorn antelope were observed in a complete aerial coverage of the 10x20.

Sharp-tailed grouse are the most common upland game bird on the 10x20. 582 sharp-tail observations were made in 1973, 1,014 in 1974 and 1,350 in 1975. Counts of male birds on their spring breeding grounds, or "leks" showed an average per lek of 12.4 in 1973, 12.5 in 1974 and 13.1 in 1975, comparing the 13 leks found originally in 1973. In 1974 and 1975, 12 additional leks were found and displaying males counted. In 1975, there was an average of 14 males per lek on 25 leks. Displaying males account for approximately one-fourth of a sharptail population, which means that the 10x20 in 1975 had 1,400 sharptails, or 7 per square mile. There has been an upward trend in sharp-tailed grouse productivity on the 10x20 for 3 years.

Sage grouse are not common on the 10x20 because, as mentioned before, there are no large expanses of big sage brush there. 4 observations of 46 sage grouse were made in 1975, 49 in 5 observations in 1974 and 20 in 6 observations in 1973. The small sage grouse population on the 10x20 appears to be stable.

Ring-necked pheasants are found primarily along Rosebud Creek and associated agricultural lands. In 1975, 108 observations totaling 352 pheasants were made. Crowing, or auditory counts were made along Rosebud Creek in 1973, 1974 and 1975. The 1973 high count was 17.1 calls per stop, 26.3 in 1974 and 19.3 in 1975. The crowing count is used as an index of pheasant populations. Crowing counts require calm, clear mornings, and the spring of 1975 did not provide many such mornings while the crowing counts were being run. The decrease in calls per stop recorded in 1975 may have been a slight drop in pheasants or only an apparent decrease due to adverse weather conditions for counting.

Although not optimum hungarian partridge habitat by any means, similar numbers of huns have been observed on the 10x20 each year. In 1975, a brood with 13 young was observed. The long-term southeastern Montana average is reported by the Fish and Game Department to be 9.7 young per brood.

A variety of ducks and some geese use the 10x20 each year, especially during the spring and fall migrations.

Coyote observations have been evenly distributed on the 10x20. 7 individual coyotes were seen in complete aerial coverages in both 1974 and 1975. Occasional sightings of red fox and bobcats have been made on the area.

A variety of raptors, including the golden eagle, is observed each year. Many species of song birds are abundant on the 10x20.

As more previously disturbed land has had vegetative cover established, observable increases in wildlife use have occurred on reclamation areas. These areas are used by mule deer, sharp-tailed grouse, various raptors and non-game birds and small mammals. One Western Energy reclamation area was estimated by a mark-and-recapture program to have 43.6 small mammals per acre.

The Colstrip 10x20 is the largest land area in Montana being systematically monitored after baseline development in relation to strip mining and power generation. To date no significant changes in wildlife populations or seasonal distributions attributable to mining or construction have appeared.

EXAMINATION OF FRANK DUNKLE

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Mr. Dunkle, you testified in the previous proceeding, but my partner had the pleasure rather than I of cross-examining you at that time. I thought we might update just a little bit to see if there are any changes in the work that you've done since that time. Have you yet published any articles which have appeared in scientific journals or publications?

A No.

Q Have you yet done any field studies on the effects of toxicants on animals, vegetation, or aquatic species?

A You talking about me personally?

Q Yes, sir.

A No.

Q Have you conducted any lab experiments?

A No.

Q Have you conducted any field studies or laboratory studies on the effects of nitrous oxides on flora or fauna?

A No, I personally have not; I have supervised most of these kind of things, but I have not personally done them.

Q Have you done any field work in any connection for the last ten years at all?

A Oh, yes.

Q What field work have you done in the last ten years?

A Well, throughout my career as a working portion of the Fish and Game Department and as the Director, I was an administrator, of course, but I supervised, helped to put together, and carried out the seeing that things happened kind of attitude. I presume that you mean in that ten years did I actually go out and pick up, look at, and weigh; not other than going into the field with people that worked for me as biologists and field people in icon helping in their training to see that they were carrying out proper functions. As Director of the Game Department, it may surprise many people to know that I was quite proficient in range studies and water studies simply because if you don't know how to do them you can't tell other people. So I would be on field supervisory work many times.

Q And you could safely tell us last year that you hadn't done any field work for ten years?

A Well, what I'm saying is that if you want to consider that field work fine; if you only want to consider it supervisory, then I have to stay with the no, I did not. But I did feel that should be qualified. The question and answer seemed to leave the fact that I didn't know anything about field work.

Q The record will have to be interpreted as it should be. The work that you did in connection with the Colstrip project did not address aquatic effects; is that correct?

A In the ten by twenty that we're talking about?

Q Aquatic effects from the Colstrip development itself?

A No.

Q Since the last time that you had a chance to testify in these proceedings, sir, have you gained any knowledge of whether the applicants have had any plans for monitoring wildlife habitat along the transmission line corridors or in the vicinity of the generating facilities at Colstrip?

A I don't know anything about corridors, but it is my total understanding that the annual monitoring of the ten by twenty, as it's called, area around Colstrip will be a continuing study.

Q Did you know, Mr. Dunkle, last year that the applicants had made any provision at all for monitoring wildlife habitat in the vicinity of the coal-fired generating stations at Colstrip?

A Say again, please; yes, I think, if I understood your question, I think the answer is yes, I was quite aware that they were doing studies.

Q Do you have your deposition handy there, Mr. Dunkle. That's your statement. Do you have your deposition of April 11, 1975.

A No, I do not; I don't have it in front of me.

Q On page 50 of that deposition, sir, the question, again by my partner, was asked of you, "Has any provision been made to your knowledge by the applicants to provide for monitoring of wildlife habitat along the transmission line corridors and in the vicinity of the coal-fired generating facilities at Colstrip, Montana, after operation has commenced"? Answer, "I have no privilege to that information if it's been determined." That was the answer you gave to the question at that time.

(Mr. Shenker shows witness his deposition.)

A My answer is still the same.

Q Still the same; okay. Now you state in your prepared testimony for this proceeding, Mr. Dunkle, that the annual report from studies in which you have been engaged have been utilized by

Western Energy Company to fulfill wildlife requirements of the Montana Strip Mining and Reclamation Act and regulations promulgated thereunder. What requirements are those?

A Those requirements I cannot state for you 1, 2, 3, but if you would like to take a moment, I would be very happy to, in the next half hour, go over and get the regulations and requirements from the State Lands.

Q Oh, I can read those as well as anybody else. I was wondering if you had them in mind?

A I would not sit here and say I would because they are much too complex, and what is needed to fulfill those is a professional study by professionals in keeping with the needs of wildlife, with their habitat needs I'm saying, with any kinds of impacts that they might experience due to any changes in the environment, any different uses of the environment, this kind of thing. So the wildlife base line studies are designed to meet those requirements in terms of what's there, what kind of condition they are in, and I'm talking about the wildlife and their related habitat, vegetation, those kinds of things.

Q Okay. You state also in your prepared testimony, Mr. Dunkle, that in four years of rendering your reports, there have been no adverse comments; on what?

A Oh, no adverse comments on the propriety and professionalism of our reports.

Q I see. Would you like some?

A Sure, you're perfectly welcome to state your opinion.

Q Oh, I didn't mean mine, Mr. Dunkle; those aren't supposed to be relevant to this proceeding.

A Oh, well, when I say yours, I mean the people that you represent, all right? How's that?

Q Okay, well, I'll keep that in mind for my contacts with my clients. Maybe I missed something in your supplemental testimony, Mr. Dunkle. Is there any place in your testimony where you refer to Colstrip 3 and 4 specifically?

A I'll look. You have an advantage, sir, you generally read something before you ask me the question, and I have to catch up.

Q This is something you wrote.

A That's right, but my memory is like many other peoples; it's about that long when it comes to regurgitating back exactly what I may have said or written. I think that we would both be safe in recognizing that the data herein and the testimony herein has reference to the Colstrip area in terms of what we have called, however you want to say, colloquially Colstrip ten by twenty area which is the area that we refer to and we do not necessarily say 1, 2, 3 or 4 in terms of the generating plants. We are base lining or we are base lining and monitoring; it was base line the first year, and then a monitoring situation thereafter. So I would think it's safe to say that you won't see 3 and 4 enumerated as such.

Q Or 1 and 2, for that matter?

A Or 1 and 2.

Q Good. Now, Mr. Dunkle, if my understanding is correct, the value of base line or monitoring information prior to the development of additional generating units in the Colstrip area, in your ten by twenty or whatever else you want to call your study area, is only as good as its availability for comparative purposes when you have something to stack the base line up against; isn't that right?

A Not necessarily, and I'll tell you why I say that. A base line is a study to determine what's there. Will you concur in that part of my answer; that's what I mean by a base line study, what's there? In the second part --

Q You're not supposed to ask me whether I concur with your answer; it's your answer. I hear what you say.

A Well, I would like you to acknowledge that you hear what I say.

Q Yes, I'm still here.

A And the second part of what I think you asked me was that do you have to compare that so that it means something? That's not necessarily true; it means something as a base line, and then as a monitoring in terms of a wildlife population. A vegetation community is a dynamic thing; it does not fit into a no growth program; it will not stay like that. Under normal conditions it changes and fluctuates and just its own pressure upon itself with game herds changes a situation rather dramatically. So what you're doing with the base line monitoring is not necessarily comparing it to anything; you are putting together information that will tell you what was there and how it has been reacting, and then, possibly, what you think you're going to find in terms of any impacts by the other studies that other people are doing.

Q Well, it seems to me, if I understand you correctly now, Mr. Dunkle, that you're telling me that base line studies have some value in determining what is there so that you know what effects developments will have on what is there, and that base line studies are also useful on a comparative basis when you have the subsequent comparative data; would that be correct?

A I would have to say you're relatively correct.

Q How do I get absolutely correct?

A Well, I could make some very flippant remarks which I won't.

MR. SHENKER: Good. Nothing further, thank you.

MR. PETERSON: I have no questions.

HEARINGS EXAMINER: Very well, you're excused, sir.

(WITNESS EXCUSED)

HEARINGS EXAMINER: Next witness. Are you ready to begin, Mr. Shenker?

MR. SHENKER: Why certainly.

HEARINGS EXAMINER: We might as well then.

C. W. RADER, appearing as a public witness, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

HEARINGS EXAMINER: Mr. Rader, in this proceeding, if you have a written statement, we don't re-read it into the record because it will go to the board and be part of the permanent record. That saves us a lot of expense of re-typing, so the procedure is, then, you'll submit yourself to cross-examination by the opponents as you're appearing as a proponent to the application, apparently, and so the opponents, then, have the privilege of cross-examination under our rules. So, Mr. Shenker, cross-examine.

(THE WRITTEN DIRECT TESTIMONY OF MR. C. W. RADER WAS DIRECTED TO BE INSERTED AT THIS POINT.)

Fergus Electric Cooperative, Inc.
"OWNED BY THOSE WE SERVE"
313 West Janeaux Street
Lewistown, Montana
Telephone 538-3465
P. O. Box 58

Statement by C. W. Rader to the Montana Board of Natural Resources
February 12, 1976 at Helena, Montana:

My name is C. W. Rader. I am manager of the Fergus Electric Cooperative, Inc., with headquarters in Lewistown, Montana.

The Fergus Electric Cooperative operates 3184 miles of power line in 13 Central Montana counties serving 5152 rural electric consumer connections.

The Fergus Electric purchases all of their power wholesale; some 72,500,000 kilowatt hours in 1975; from the Montana Power Company.

I have always advocated full development of our natural resources for the good of all the people of the United States and especially the people of Montana.

The completion of Electric Generating plants #1 and #2 at Colstrip and the future construction of Electric Generating plants #3 and #4 at Colstrip, with relating transmission lines, are of great importance to the people of Montana.

The people of Montana are fortunate to have companies with the ability to raise capital and possess the expertise to get the job done.

The State of Montana is presently importing electric power from the West from downstream generation on the Columbia River. The State of Montana is presently importing electric power from the East from downstream generation on the Missouri River.

With the completion of construction of Colstrip #1, #2, #3, and #4 electric generating plants, Montana can become an exporter of electricity for a few years and have an adequate supply of electric power for Montana for many years.

Those rural electrics in Montana, who presently depend on the Bureau of Reclamation for their power supply, have been notified that their growth needs will not be supplied beyond 1977. Thus the further need for more electric generation in Montana.

The Fergus Electric sells and delivers power to many farms and ranches for irrigation purposes. The demand for this type service increased 20% from 1974 through 1975. We expect a like increase each year for several future years. Our ability to continue to provide electricity for this purpose is important to the people of Montana and the rest of the World.

I urge the Montana Board of Natural Resources to approve the construction of Colstrip generating plants #3 and #4 and relating transmission lines. Let's get on with the job at hand.

EXAMINATION OF C. W. RADER

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Mr. Rader, when did you prepare your statement, sir?

A Yesterday morning.

Q Did you have a chance to discuss it with Mr. Ross before you put it down?

A I did.

Q You were chatting with him over there just a little bit ago when you came in. Was he the fellow that managed to get you up here in time?

A I was just telling him about what the weather was like out across the country.

Q Ah, pretty dusty coming up, right? Now, Mr. Rader, I assume that you're here in your capacity as the manager of the Fergus Electric Cooperative; would that be right?

A That's right.

Q Your job is to make sure you deliver the power to the folks who want it, right?

A Right.

Q Okay. Are you aware of the fact, Mr. Rader, that the state of Montana at the moment is a net exporter of power?

A I believe that they import considerable amounts at certain times, too. I'm sure that the rural electrics west of the divide that buy their power from Bonneville no doubt use considerable amounts of imported power, and there are three cooperatives on the eastern border of Montana, located at Medicine Lake, Ekalaka, and Wibaux that get all of their power from

North Dakota.

Q Well, I didn't ask you that, Mr. Rader. I asked you if you were aware of the fact that Montana as a state is a net exporter of power? Do you understand my question?

A Well, what do you mean by net now?

Q That Montana sends more power out of Montana than it gets into Montana over the course of a year?

A No, I'm not aware of that.

Q Have you looked at any statistics to show what the net figure is on power going in or out of Montana?

A No, I haven't.

Q Now, Mr. Rader, you say in your page statement here, sir, that some of the rural electrics have been notified by the Bureau of Reclamation that it will not be supplying all of the power to the rural electrics beyond 1977. Do you understand that the Bureau of Reclamation will continue to supply power to the rural electrics in some degree after 1977?

A If you will read closer there, you'll see I say growth needs.

Q Yes, I wanted to get to that; when you mean growth needs, I take it you mean that the current level of power supplied by the Bureau of Reclamation will be continued; is that right?

A Right.

Q Now do you know what sources of delivery of power for the rural electrics would be available for what you call growth needs?

A Well, I would say that private power companies is the most likely source.

Q What other sources are there?

A There's Bonneville on the west, but at the present time most of Bonneville is going west.

Q Do you know of anybody to the south or anybody to the east who might be a supplier?

A Not to my knowledge.

Q Have you investigated that, sir?

A No.

Q Can you tell me, Mr. Rader, on what basis you would project what your growth needs will be in 1978?

A We project a 5 percent increase per year until '85.

Q Is that based upon your past history and trends as you project them?

A Past history and present conditions primarily with the high prices of other sources of energy, and we are being asked to supply more than what we would ordinarily would be if the other sources would be equivalent or available.

Q So that percentage figure you just gave me is up a little bit higher than it would otherwise be based upon the past history that you projected.

A Yes, right.

Q Okay.

MR. SHENKER: Nothing further. Thanks, Mr. Rader, we appreciate your coming up and to be able to help us.

HEARINGS EXAMINER: Thank you, Mr. Rader.

(WITNESS EXCUSED)

HEARINGS EXAMINER: Now I think the next question is whether we -- do you know of anyone else?

MR. ROSS. I know of no further witnesses that are coming in today.

HEARINGS EXAMINER: I'm not advised of any other, and I wonder if we shouldn't recess. What's your view?

MR. SHENKER: Well, what's the alternative? Do you want to sit here and smile at each other.

HEARINGS EXAMINER: Well, in case anybody stumbled in.

MR. SHENKER: Well, if we don't know of anybody --

HEARINGS EXAMINER: How about 9:00 A.M. in the morning? Let's recess until 9:00 A.M. in the morning.

(RECESS AT 3:30 P.M.)

THURSDAY, FEBRUARY 12, 1976

The hearing reconvened at 9:28 A.M. on Thursday, February 12, 1976, in the Chambers of the Montana House of Representatives, State Capitol, Helena, Montana.

The Honorable Carl M. Davis, Hearings Examiner, presided over the proceedings.

APPEARANCES:

Applicants:

William M. Bellingham, Esq.
John L. Peterson, Esq.
John Ross, Esq.

Department of Natural Resources and Conservation:

Arden E. Shenker, Esq.
Donald MacIntyre, Esq.
Ted J. Doney, Esq.

The following proceedings were had:

J. EARL MORRISON, appearing as a public witness, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

HEARINGS EXAMINER: Mr. Morrison, under our rules of procedure, your written statement will be received in evidence and go to the Board of Natural Resources and made part of the proceedings. However, we don't need to re-read it or repeat it here; you'll simply be subject to -- be asked questions on it by Mr. Shenker, who represents the Board of Natural Resources. So you may proceed, Mr. Shenker.

(THE WRITTEN DIRECT TESTIMONY OF MR. J. EARL MORRISON WAS DIRECTED TO BE INSERTED AT THIS POINT.)

Midland Implement
Company Incorporated
Wholesale Distributors
BILLINGS ● PHONE 406 248-7771 GREAT FALLS ● PHONE 406 453-7618
TELEX 031-9420
P O BOX 30358
402 DANIELS ST., N P INDUSTRIAL SITE
Billings, Montana 59107

February 10, 1976

TO: BOARD OF NATURAL RESOURCES AND CONVERSATION
HELENA, MONTANA 59601

FROM: J. EARL MORRISON, SALES MANAGER
PUMP AND IRRIGATION DIVISION
MIDLAND IMPLEMENT COMPANY, INC.
BILLINGS AND GREAT FALLS, MONTANA

SUBJECT: COLSTRIP #3 AND #4, RECOMMENDATION FOR:

1. MR. CHAIRMAN, LADIES AND GENTLEMEN:

2. A brief history of who I am, what I do, and what I have done.

My name is Earl Morrison, I live at 2415 Patricia Lane, Billings, Montana - I am Sales Manager of the Pump & Irrigation Division of Midland Implement Company, Billings, and Great Falls, Montana. My education background includes Yakima Valley Junior College, Yakima, Washington and the University of Washington in Seattle in the School of Botany. I am an associate member of the American Society of Agricultural Engineers, the Soil and Water Division. I have just finished a tour on the Board of Directors of the National Sprinkler Irrigation Association, I have also just finished a two year tour as Commodity Chairman of the Agricultural Sprinkler Irrigation Division of the S.I.A. - I am at the present time a member of the Education Committee of this same organization.

3. Our principal type of business is the distribution of agricultural equipment, appliances, recreational equipment, golf course equipment, and sprinkler irrigation equipment, in all of Montana and the Northern thirteen counties of Wyoming. Our company is locally owned and has been in business 55 years. We have over 100 employees including about fifteen salesmen. My responsibilities again - I am in charge of Agricultural and Turf Irrigation sales for the company.

4. Ladies and Gentlemen, I appear before you today, by the grace of the Board, to talk about Sprinkler Irrigation as it pertains to our agricultural development in Montana. I am here recommending approval for the construction of Colstrip #3 and #4. Now, let's get down to some statistics and facts as I see them, or that has been brought forward by other sources. My attempt here is to paint a mental picture of what's going to happen in agriculture and irrigation in the next few decades in our State of Montana and what we should do to help it along.

5. Now, let's set the stage by looking at some irrigated acreages in the Northwestern states - both from total irrigation and the amount that is under sprinklers. These figures come from the 1964 census of agriculture and an irrigation survey in the 1974 magazine "Irrigation Journal".

	IRRIGATED ACRES		SPRINKLED ACRES		PERCENT OF CHANGE SPRINKLING 1964-74	
	1964	1974	1964	1974	ACRES	PERCENT
WASH.	1,149,842	1,569,000	372,000	767,000	395,000	106.2
ORE.	1,606,947	1,880,000	370,000	745,000	375,000	101.4
ONT.	1,893,360	3,400,000	67,745	500,000	432,255	638.1

I cite the above states to show what has happened in power requirements in the four states in a ten year period. These are all states that have power companies involved in the building of Colstrip #3 and #4. You will note that the state with the largest growth percentage record is Montana and yet we have only begun to feel the impact of this demand.

6. In 1970 there were only twelve sprinkler irrigation dealers in Montana - three of those were fairly large dealers doing about $250,000.00 each in sales - the other nine dealers were doing from $25,000.00 to $75,000.00. We can average that out and say the sales volume was about $1,200,000.00.

So in 1970:

Dealers	Amount of Sales Each		Acres ($150.00 Cost per Acre)		HP Estimate [redacted].6 per acre	
3	250,000.00	750,000.00	5,000	3000	[redacted] HP	jem
9	50,000.00	450,000.00	3,000	1800	[redacted] HP	
		$1,200,000.00	8,000 Acres	4800	[redacted] HP	

Now look at 1975: (Five years later)

					HP Estimate [redacted].6 per Acre	
4 with 1 or more branches	1,000,000.00	4,000,000.00	17,777	10,666	[redacted] HP	jem
20 Dealers	150,000.00	3,000,000.00	13,333	8000	[redacted] HP	
		$ 7,000,000.00	31,110	18,666	[redacted] HP	

I list the above figures to show what happened during those five years. These figures were gathered through personal talks with members of the Montana Sprinkler Association and suppliers of irrigation equipment.

Montana Power tells me they had a load increase for irrigation in 1974 of 14,000 HP. Mr. Neil G. Schlaeppi, Operations Field Representative of Montana Rural Electric Co-op's tells me that in 1970 their KWH load for irrigation was 18,149,000 KWH and by 1974 it had jumped 164% to 47,869,000.

7. Now, let's look at some other figures given to me at my request from Mr. Robert McPhail, Regional Director, Upper Missouri Region, Bureau of Reclamation, U.S. Dept. of Interior, Billings, Montana. He claims the Bureau shows about 839,000 acres of available irrigable land in Montana above flood plain that varies from 80' to 400' in pumping elevations. This, he claims, will call for 457,000 kilowatts and energy requirements of 879,000,000 KW hours. This is only for lifting the water to the acreage - it does not include power to sprinkle which can add another 3/4 HP per acre to that demand. He feels this land will come under irrigation in the next ten years. I ran across some interesting figures the other day in the December, 1975 issue of the Montana Rural Electric News. They ran a survey in all the counties in Montana in which they are represented. The question asked of their subscribers was - "What are Your Irrigation Plans for 1976-77"? Here's their tabulation:

Present Irrigated Acreage

Sprinkler		Gravity
Pivot	Others	
34,891	216,517	1,822,848

New Acres Planned for 1976-77

Sprinkler		Gravity
Pivot	Others	
40,333	49,344	22,654

Converted Systems for Past Two Years

Flood to Sprinkler	Sprinkler to Flood
41,489	455

Number and Type of Pumping Station

Gas	Electric	Diesel	L/P Gas
150	2927	358	46

Based on the increase of sprinklers from 1964 thru 1975, and the large acreage still untouched, and the growing demand for food, I predict the next ten years will call for four times the energy requirements over 1964-75. Frankly, I think this is a conservative estimate.

8. The energy demand in agriculture is here at the present time, and growing at a tremendous rate. The starving world wants our grain and beef. The name of the game now is increased production on the available acres. This calls for better production methods. What can we do in Montana to help all this along?

9. Here are some points I would like to make in favor of having Colstrip #3 and #4 built here rather than in Washington, Oregon or Idaho.

    (a) It's easy enough to see, from figures shown that we have an agriculture demand alone for one 700,000 KW generator within the next eight to ten years. This of course is a summer load so would not interfere with the high winter demand load.

(b) We should have control of our rate structure for our agricultural demand. Our growing season is short so our farmers need all the help possible in holding down costs. If the generating is done in Washington or Idaho, we're at their mercy when it comes to rate costs.

(c) The longer the power lines the more loss in efficiency and the higher the cost per KW. This is especially true when moving large loads back to Montana.

(d) The railroads would like to have the freight income, but we in Montana would lose control of the rate structure and again pay more per KW. Let's raise more grain and cattle and let the railroads compete for that business.

10. Some of you may wonder why electric power is so important in running sprinkler equipment. The main reason is the lower cost. Here's an example: A pumping job using the following data -

(1) Pumping load 1,000 g.p.m.
(2) Pressure 70 lbs. or 160'
(3) Pump efficiency 70%
(4) Electric motor efficiency 90%
(5) Electric power 1.22¢ KWH
(6) Diesel fuel (.065 gals / HP / Hr.-.37¢ gal.
(7) Gasoline (.110 gal / HP / Hr.-.51¢ gal.
(8) Overall pump efficiency 70%
(9) KW per HP .746

Using Formula

$$\frac{1{,}000 \text{ g.p.m.} \times 160' \text{ T.D.H.} \times \% \text{ HP/gal.} \times \text{cost per gal. or KW}}{3960 \times (.70 \times 90 \text{ Elec.})\ 70\% \text{ OA on Diesel \& Gas}}$$

We come up with the following irrigation costs per hour not counting maintenance and overhaul.

(1)	Gasoline	3.24 per hour
(2)	Diesel	1.38 per hour
(3)	Electric	.58 per hour

From the above you can see how important it is for the farmer-rancher to have electric power for his irrigation needs.

11. I could go on and on with estimates of increased pumping demands but I'm sure you've heard enough. The problem isn't the cost of electricity or its desirability - the problem is, shall we generate it here or on the coast. We in the agricultural sprinkler business say - generate it here at Colstrip so we can control the price and thereby help keep our farmers and ranchers in a competitive picture for the world beef and grain market.

We are also saying that the demand for agricultural sprinkling alone in the next ten years exceeds the 30% of Montana Power's share in Colstrip #3 and #4.

EXAMINATION OF J. EARL MORRISON

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Mr. Morrison, when did you get your statement prepared, sir?

A When did I?

Q Yes.

A Well, I finished it up about two or three days ago. You notice some corrections on there that I had to make on the last line. Those were mathematical computations which I just had turned around backwards.

Q Okay. You mention in your statement that you want to bring together some statistics and facts as you see them, or, as you say, "that has been brought forward by other sources," quoting from your statement. What were the other sources that you meant, sir?

A Well, I was referring to that statement there of the acreages, and that's what I was referring to.

Q You haven't independently verified for yourself any of that stuff, have you?

A I have verified that from the sources that -- I picked up the acreages from a couple of different sources there. That's what I was referring to on that.

Q Yes, you've just relied upon the folks to give you that information?

A Yes, and I found that even they're not quite the same and so you've got to interpolate between them.

Q Yes, change it sometimes. Let me ask you, if I can, Mr. Morrison, to compare some stuff for us. On the seventh paragraph of your statement, on page 4, four lines into that paragraph, you refer to a claim from the regional director of the Bureau of Reclamation that there's some 839,000 acres of available irrigable land in Montana. Now would that be on top of the 3,400,000 irrigated acres in 1974?

A Yes, sir. These are acreages that are above flood plane, and they are available now for irrigation with a little pumping to go with it.

Q So that would mean that you would have, if you used all of the acres of available irrigable land, you'd add together the 3,400,000 and the 839,000 and that would give you the total of what's available?

A Yes, I think that 3,400,000 was what was presently being irrigated. Now that isn't exactly true because there are a lot of smaller projects around that are being handled privately, but not through the Department of the Interior and I have no figures on those.

Q Well, the best you can put together, then, these two figures together are the information that you have?

A They are the only ones we can substantiate right now from government sources.

Q Okay. So, roughly, that's what, about 25 percent more in terms of irrigable acres that are available, right?

A Yes.

Q And, according to Mr. McPhail, those irrigable acres should come into irrigation in a period of about ten years?

A It depends on government appropriations, of course, but he thinks there is a great possibility of that.

Q Okay. Then on page 5 of your statement, you're predicting a four fold increase in energy requirements over an eleven year period, right?

A Right.

Q Do you know what the current level of energy consumption is by irrigation in Montana?

A No, there's too many power companies involved, and I just could not come up with those figures.

Q Well, tell me, Mr. Morrison, how did you come up with the figure of 700,000 kilowatts as necessary for agricultural demand alone in your statement?

A Well, if you go back to the statement I made from the public power and their increase and my estimates based on these figures that I have shown in here, and then this 839,000 acres not including the sprinkler part of it, it is not very difficult to add up to 700,000 kilowatts. This one alone will take, 839,000 acres, will take for sprinkling alone would be, well for pumping alone, as I recall, was 450,000 kilowatts alone. And then if you add the sprinkling on top of that which takes about 3/4 of a horsepower per acre, there alone you're almost up to my estimate of 700,000.

Q Well, let's see now; we don't know from your figures what the current consumption of energy is by agricultural use as a whole, do we?

A No, I don't have that figure; I've got yearly figures that I have in here, but not a total per se.

Q Yes, so you couldn't tell from your statement what the current agricultural use is, but you do have an estimate of some

700,000 kilowatts that you see coming. Now you make several points on page 6 of your statement; I wanted to ask you about them. The first of those statements is that you think it's a good idea for Montanans to have control of their rate structure for agricultural demand. You would agree, would you not, Mr. Morrison, that's a good thing for other sectors of the economy in Montana, too?

A Yes, very definitely. You mean for the personal use and for other?

Q Yes, residential and commercial and industrial; they should all have rate structure control, shouldn't they?

A Yes, sir.

Q Okay. I see the very interesting point that you make next that the longer the power lines, the more loss of efficiency and the higher the cost per kilowatt. That's widely known, of course. Is that something that concerns you, sir?

A Well, it concerns me only in this -- if we go over to Washington and Oregon and wheel it back, I think that's what the power companies call it, I know from hydraulics that there is generally a 20 percent loss in running water or oil or anything like that. And I would assume, now I'm assuming this, there is probably about that same loss in electrical energy, and so that loss has got to be charged to somebody.

Q Doesn't it sort of stand to reason, Mr. Morrison, that if you are going to take 70 percent of the power and ship it on these very long lines all the way to the west coast and keep 30 percent of the power in Montana, that a more efficient way to go about the process is to have the 70 percent generated closer to a load center so you don't have that big loss, and have the 30 percent generated somewhere closer to the Montana centers so that you wouldn't have a loss here, too. Doesn't that make more sense?

A You're saying to build another generator only for the 30 percent; isn't that what you're saying?

Q Yes, from the standpoint that you make here of the efficiency in which you use the energy rather than lose it?

A Well, it's my understanding, though, we're only talking about these two 700,000 kW generators; we're not talking about anything else. There might be some better way of doing it; I'm not saying there isn't.

Q I see, I see. You haven't looked at that Montana Utility Siting Act to see what all those grounds are in there; have you?

A No, I'm saying why ship all the -- in essense I'm saying why ship all the power out there by, or why haul all the coal out there and then ship the power back to us? Why don't we generate it here, and keep control of the rates; that's what I'm saying.

Q Yes, I understand your point, sir. I also understand that you did not come here today prepared to discuss alternatives to these particular units that are proposed?

A I'm not knowledgeable in that field, and I have no --

Q There may be some better alternatives to accomplish the points that you're talking about, but that's not what you're here to discuss?

A I'm talking about two 700,000 kilowatt generators, that's all.

Q Okay. Now if, Mr. Morrison, the Public Service Commission of Montana were to take a fairly tough stand with respect to rate structure and rate control, notwithstanding what the railroads might be interested in doing, that would accomplish the third of the points that you make on the sixth page of your statement there that you don't want Montana to lose control of the rate structures; isn't that right?

A Right.

Q I'm also interested, sir, in the point that you make in the tenth paragraph of your statement on page 6 where you say that electric power is so important to running sprinkler equipment because of the lower cost. That just makes sense, of course, for anybody who's in business; they want to pay as little as possible to operate their businesses when you're talking about irrigation and sprinkling. Would you expect that if the costs were substantially to rise that that would affect the judgment of those who were using the services?

A I don't follow your reasoning there, you want to elaborate a little bit more?

Q Oh, sure. You tell us in your statement that one of the reasons that electric power is so important in running the sprinklers is low cost. Now if you didn't have the low costs, how would that affect the use of the power in running the sprinklers?

A Well, if we didn't have it, we'd have to utilize some other energy if it was available.

Q Okay.

A I was merely trying to show the difference in the costs based on today's prices for someone that may not know.

Q Okay. Just a couple more points that I wanted to ask you about, Mr. Morrison. On the last page of your statement, you phrased the problem as whether power should be generated here or generated on the west coast. I take it that we should view that statement from you, within the context of what you just told me a little bit ago, that you have not come here to look at any alternatives to the proposed Colstrip units; is that right?

A No.

Q My statement is right?

A You're right; I mean I'm not facing up to any other alternatives; that's for other people.

Q All right. And finally, sir, when you talk about the demand for agricultural sprinkling alone in the next ten years, you say that that exceeds the 30 percent of Montana Power's share in the Colstrip units 3 and 4. Did you know, Mr. Morrison, that if we applied the projections that are made by the applicants here in this proceeding to the capacity which they will have available within the next ten years to service the irrigation loads that you have described in your statement, that it would be 2,500 times the size of the load that you are projecting?

A I wouldn't know.

MR. SHENKER: I have nothing further. Thank you, Mr. Morrison.

HEARINGS EXAMINER: Thank you, Mr. Morrison, for your attendance, and you are excused.

(WITNESS EXCUSED)

HEARINGS EXAMINER: Your next witness, gentlemen?

ROBERT LABRIE, recalled as a witness by the applicants for the purposes of additional testimony, having been previously sworn upon his oath, was further examined and testified as follows:

(THE ADDENDUM OF TESTIMONY OF ROBERT LABRIE WAS DIRECTED TO BE INSERTED AT THIS POINT.)

ADDENDUM TO STATEMENT OF TESTIMONY OF

ROBERT LABRIE

My name is Robert Labrie and I have previously testified in this hearing. Included in my former testimony was the statement that geothermal technology, the harnessing of heat from underground water, is another alternative but there is no known practical applications of this resource in Montana at this time. Although we had not previously intended to introduce into evidence any studies made on behalf of Montana Power regarding geothermal steam development, yet because attorneys for the opposition requested me upon cross-examination to produce such studies, we have decided in introduce the two studies previously made. Applicants' Exhibit No. 227 is a memorandum to Mr. L. S. Stadler titled "Analysis of 'Geothermal Power Economics'" dated April 4, 1969. The study was prepared by me in the usual and ordinary course of Montana Power business and is true and correct. This study takes the costs presented in a paper entitled "Geothermal Power Economics" written by Facca and Dam of the Worldwide Geothermal Exploration Company, and adjusts them to correct for obvious mathematical and equipment cost errors, then escalates them to 1968 and compares them to the cost of power at the Corette plant at Billings, Montana, when operating at the same load factor. The conclusion of the study is that the energy cost of the Corette plant was below all of the geothermal power costs included in the Facca and Dam study.

Applicants' Exhibit No. 228 is another memorandum relative to geothermal power, this one being titled "Geothermal Power -

Economic Analysis of Geothermal Steam Development". It is dated November 16, 1970, and was prepared by Larry D. Thompson, at that time an engineer in the Engineering Department of Montana Power. It was prepared in the usual and ordinary course of business of the company and Thompson worked under my supervision and control. The purpose of the study was to present a collection of graphs and tables for use as a guideline by the Geology Department in predicting the economic feasibility of developing a given geothermal steam field for power generation.

I supervised the planning section of the Montana Power Engineering Department from 1969 to 1975 and accordingly am familiar with the planning and studies produced during this period of time. In my previous testimony I went into detail into our studies covering the possible locations of generating plants in Montana prior to the time that Colstrip was chosen as the plant site late in 1970. During the course of our analyzing each plant site we considered the alternative of shipping coal to the site from Colstrip. We were very much concerned about freight rate escalation in the future because we would, of course, need freight transportation in the event that coal was moved to a generating site elsewhere than Colstrip. Colstrip, of course, was our utlimate choice for various reasons previously given. One of these reasons was because the source of coal at Colstrip was located so close that the company would not be subject to future escalation in freight rates.

Prior to the time that the "Colstrip-Pacific Northwest Study" (Applicants' Exhibit 16) dated November 17, 1972, was prepared in its final form, the study of various alternatives was made relative to different types of transmission systems and the shipment of coal to a location outside of Montana. A study of these alternatives reduced to writing is Applicants' Exhibit No. 229, a memorandum from me to R. A. Hofacker dated September 7, 1972. The first two pages of the exhibit were prepared by me and the last two pages by E. L. Hedegaard, an engineer then with the planning section. It was prepared in the usual and ordinary course of business.

Exhibit No. 229 is concerned with a comparison of the costs of transmission of electricity from a generating plant located at Colstrip to various applicants' load centers with the costs of transporting coal from Colstrip to a generating plant located at Boardman, Oregon, and the subsequent transmission of electricity to various applicants' load centers. Three transmission line possibilities were analyzed in connection with the Colstrip generation location. In the cost comparison section of the study, using the freight rate of six mills per ton-mile, the Colstrip generation plant location came out cheaper than the Boardman location. The freight rate of six mills per ton-mile for hauling coal from Colstrip to Boardman was based upon data obtained from Portland General Electric Company. It now appears that this freight rate was much too low. Furthermore, the freight rate was not escalated beyond 1975 for the life of the plant and if this had been done, the results of the study would have been much more favorable to the Colstrip generation location.

MR. BELLINGHAM: I have submitted to the recorder written testimony labeled, "Addendum to Statement of Testimony of Robert Labrie," and at this time the applicants offer into evidence Exhibits 227, 228, and 229.

HEARINGS EXAMINER: You may cross-examine, sir.

EXAMINATION OF ROBERT LABRIE

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

MR. SHENKER: Mr. Davis, in my view the statement offered as purported addendum to Mr. Labrie's testimony is really most properly rebuttal. I don't raise that objection at this point; we received his statement on February 8, and I have no problem in asking him any questions I wanted to ask him at this time because of my view with respect to the general informality of the application of rules in this proceeding.

HEARINGS EXAMINER: Thank you.

Q I think you have been here before, Mr. Labrie?

A Yes, sir.

Q The first exhibit that you refer to in your statement addendum is Exhibit number 227 which is one of two memoranda on geothermal power that you've produced. I take it in response to our request, Mr. Labrie, you've searched your files and you've found that these are the only memoranda that exist on geothermal power; would that be correct?

A Well, I believe there are others, these are the two that I specifically was thinking about in my testimony, and had been involved in preparing.

Q Are there any subsequent memoranda in your files on geothermal power after November of 1970?

A There is at least one more memoranda, whether it's in my file or not I can't recall, but our exploration department after -- well, let me say it this way. The first memoranda here was to take a look at the overall picture of geothermal power and try to put it into perspective for our geology department. The second one was to give them a tool whereby they could further investigate geothermal power and to tell them whether a particular field might be in the order of being economic and warrant further study. After that the exploration department further updated this with data that I obtained and they obtained from Pacific Gas and Electric on the geyser field. And then after that we retained an outside consultant and did a geothermal power survey.

Q Who was that outside consultant?

A That was Dr. Chadwick from Montana State University.

Q Has he rendered a report to you for his survey?

A Yes, he has.

Q When was that done?

A That was in 1973.

Q Do you have a copy of that with you today?

A Yes.

Q Could I take a look at that, please?

MR. BELLINGHAM: We have a copy of the report referred to by Mr. Shenker marked Applicants Exhibit number 230. We have only one copy with us, and we intend to introduce it into evidence at which time further copies will be made.

MR. SHENKER: Do you intend to introduce it through Mr. Labrie?

MR. BELLINGHAM: Yes, sir.

MR. SHENKER: The old hidden ball.

MR. BELLINGHAM: What was the last statement? Oh, not at all.

Q Now aside from this rather thick report from Dr. Chadwick and the two memoranda that you brought to the proceeding as exhibits, Mr. Labrie, are there other memoranda in the files of the Montana Power Company on geothermal power analyses?

A I believe I mentioned that the exploration department also wrote a memoranda which was not in my files.

Q Do you have that with you today, too?

A I may have it here, I'm not sure. I'd have to look.

Q In a few minutes, sir, I'm going to ask to take a little pause so that I can read this lengthy report from Dr. Chadwick. While I'm doing that, maybe you could look for the other memorandum.

A Okay, now?

Q No, no, I want to ask you some questions about the stuff that you had given us last Sunday.

A Oh, I should say there are probably other memoranda that I haven't located that deal with the Marysville situation because we've dealt with, or met with Battelle Northwest and we're quite interested in that development. So there's been a long history in our case of the study of geothermal power and its possible use in the Montana Power system.

Q All right, let me ask you then what your involvement has been in the Marysville project? Are you a cooperating venturer, explorer, or just an interested observer?

A As far as I am personally concerned, an interested observer, but in case they show up with something -- since then it's been abandoned, but in case it was to develop into something further, it may have EPRI funds, I don't know. If it did, that would have been partly contributed to by Montana Power.

Q But you, in any event, are not initiating any of those studies?

A Not the Marysville, no.

Q Are you initiating any studies now with respect to the use of geothermal power?

A No, not at the moment.

Q Have you discussed with the representatives of Portland General Electric Company their initiatives on the use of geothermal power?

A I have no idea what any of the other utilities are doing.

Q Okay. In Exhibit number 227, Mr. Labrie, a memorandum to Mr. Stadler from you of April 4, 1969, you state that the life of the Geyser, California field is considered infinite. I wonder if you could expand on that for us? In this proceeding, of course, we're dealing with resources that we consider finite, such as coal; you use it up and it's gone. What do you mean that the resources of the Geyser, California field are infinite?

A Well, nothing, of course, is infinite, but what I believe I meant at that time was that at the withdrawal of rates from the Geyser field, the base pressure, not counting pressure dropped due to holes plugging up and so on, was not dropping so the field was capable of unknown further development.

Q Well beyond the thirty year life, for example, if you use that period of time?

A Thirty year life at the withdrawal rates that they were taking it out, yes. Since then they are expanding this field.

Q Yes. Do you recall, Mr. Labrie, what the current estimate is of the installation of the Colstrip units on a mills per kilowatt hour basis?

A Which Colstrip units?

Q Three and four.

A You mean 1980 dollars or '69 dollars is this report or what?

Q Well, give them to me whichever way you can, and we'll see if we can get some equivalencies.

A I don't think I can pull a number out of my head under any circumstance without looking back and finding out. There's been so many different studies made that I can't recall which one is which.

Q Can you give me a range of what the mills per kilowatt hours would be for projected Colstrip units?

A I may even have it in evidence. I am very much afraid if I give you a range it's going to be incorrect, and I'd rather check and find out.

Q Well, are we between four and ten, or are we between three and twenty.

A Oh, I think we're up around twenty, or fifteen to twenty, somewhere in there.

Q If you look with me next, Mr. Labrie, at Exhibit number 228, that's the memorandum of November 16, 1970 from Larry Thompson. The appendix to that memorandum starts on page 3. Now you know the question I'm going to ask you; I always ask you questions like that. What happened to pages 1 and 2?

A I can't recall, Mr. Shenker. Mr. Thompson did quite a lot of work at my direction on this thing, and I can vaguely recall asking him -- well, here I can see from looking at it; the tables were superimposed between page 2 and page 3. That's the answer.

Q You mean the tables that now precede the appendix used to be pages 1 and 2?

A Yes, and the reason for doing that is that the appendix just documents how the thing is done in an example. It isn't necessary to use the appendix to evaluate a geothermal resource.

Q Okay. Now the next exhibit that you refer to in your statement addendum, Mr. Labrie, is a memorandum of September 7, 1972 from you to Mr. Hofacker, and that's number 229. This, of course, was in the period of time when you were completing a lot of your economic studies on the various ways to go and the use of projected units Colstrip 3 and 4, right?

A This is the period after the presidents directed us to make feasibility studies and we had the task force formed from the different applicant utilities. This is part of the work that was done in preparation for the final report that was the Pacific Northwest study.

Q Which was a November 1972 report?

A That sounds right.

Q Yes, and it was in August of 1972 that four of the five Colstrip applicants agreed to proceed with Colstrip units 3 and 4?

A That checks my memory.

Q Right. Now on Colstrip generation, paragraph 1-A, you make the conclusion that a one line 500 kV system appears more economical than the two line 500 kV system. Without getting into the supporting details that may explain that statement as the assumptions that you have made, can you just tell me in a general way why that was true?

A Well, it costs less to build a single line, large conductor 500 kV AC line than it does to build two of them, and, of course, it has much less reliability. Just from the strictly cost point of view, this would be a more economic plan than was considered.

Q Okay. In the next paragraph, B, you make the statement that two 500 kV Colstrip to Hot Springs lines will probably carry an additional 700 megawatt generator; additional to what?

A Additional to the two that we were studying.

Q So that would be beyond Colstrip units 3 and 4?

A That's correct.

Q Well, that's consistent with the point that you make at the end of paragraph B that it would require the addition of a number 5 generator with further studies?

A Would you say that again, please?

Q Yes, in the last part of that paragraph 1-B of Exhibit 229, you look at the addition of a number 5 generator as requiring further studies?

A Oh, that's correct, yes.

Q Yes.

A There were also some other proposals; for instance, Pacific was talking about a need for wheeling more power and we were looking at interchanges with Wyoming and so on.

Q Then on paragraph 3, your cost comparisons, you describe two 700 megawatt units and three 700 megawatt units each with 80 percent plant factors?

A That's correct.

Q Did you do a study on 75 percent plant factors?

A Not at that point in time. Our assumptions and our thinking at that point in time was that the maximum availability we could get was 80. And, of course, it wouldn't make any difference to the study.

Q Now as I read the first graph, or I guess it's the only graph that's attached to Exhibit number 229, it's labeled Puget, PGE, Washington Water Power, and Montana combined transmission and wheeling costs in September of '72, and it's done by ELH, one of the engineers in your department?

A Yes.

Q Yes. I think what that tells me is if you have a freight rate structure for hauling coal by unit train at something less than 5.5 mills per ton mile, then that would be cheaper than building all the units at Colstrip with two 500 kV lines to Hot Springs. Is that the way I read that graph?

A Yes, I think the write-up says 5.3 rather than 5.5, but it looks to me like the curve says 5.4 so it's a matter of how you look at it.

Q It was a thick pencil that went through the graph?

A Yes, and no study is any more accurate than that.

Q Now maybe I just missed it, you can point it out to me, Mr. Labrie, but in your statement of the basic assumptions for that graph on the page which follows the graph, is there someplace where you point out what the number of units at Boardman would be at 700 megawatts?

A No, the --

Q Do you know what the assumption was?

A The number of units were not involved except in the sense that we had in the study coal handling facilities, but -- well, no, wait a minute. No, it does indicate two 700 megawatt units and that's what the study would be based on. At this point in time, as you can see, we also were looking at three 700 megawatt units because of the advantage to the transmission system costwise; but the study was based on two.

Q Okay. If you will look with me now at those assumptions and directing your attention first to paragraph 5 of the assumptions, Mr. Labrie, you pointed out that Boardman was soon to require a coal stockpile at $7.65 a ton, whereas Colstrip was $2.10 a ton. Now is that just a coal cost alone?

A Well, in the case of Boardman, it included the freight to get the coal there?

Q Okay. Paragraph 6 says that you assume that Colstrip water would cost $48.00 an acre foot more than at Boardman. Do you know why that would be true?

A As I recall, at the time we made this study we were assuming that we would buy water from Yellowtail, and I think that's what this was.

Q And that water was cheaper than some water that was available for Boardman?

A No, it would be more expensive than some water that was available for Boardman.

Q I meant the other way around.

A Right. We wanted to be sure to give Boardman all the advantages we could think of.

Q Do you remember what the water source was for Boardman?

A I think we assumed zero.

Q Why was that?

A Well, we had no detail on it, and we said if this thing stands up assuming zero, if there is any cost at Boardman, obviously it's better to go transmission so, again, what we were trying to do was to do the conservative study.

Q Is that the use of the word conservative the same way Larry Faith used it?

A I don't recall how Larry Faith does, but it's the same way that Roger Hofacker used it in studies that he did.

Q Okay, yes, we have that use of term from him. Now in paragraph ten of your assumptions, one of the assumptions is that an equity return of 12 percent on the total investment; is that correct?

A That's correct -- oh, wait a minute. No, equity return was 12 percent on the equity share of the investment, and it's a fifty fifty debt ratio so it would be 6 percent on the total investment.

Q Okay. So the equity return is only on the equity investment alone?

A That's correct.

Q Okay. And you assume a levelizing of your costs over a 39 year period as a rate of 10 percent beginning in 1975?

A That's right?

Q Why did you do that?

A Why the 10 percent?

Q Yes.

A The 10 percent comes from the above figures; 12 percent equity return on 50 percent of the investment and 80 percent interest on the other 50 percent gives you an average overall rate of return of 10 percent. So we use that for discounting.

Q Okay. And at the same time you also assumed use of gas turbines to cover an additional 131 megawatt reserve if you used the one line system?

A That's right.

Q Would those have been Montana Power Company gas turbines?

A Well, I don't know. We certainly wouldn't have carried it that far. What we were thinking about was that one line was less reliable than two and this, to some extent, would make up the difference.

Q So whoever had the gas turbine capacity, that would be the reserve you were talking about?

A Or perhaps each applicant would have gas turbines proportionate to his share of the project.

Q Now the last statement in the assumption number 12 confuses me a little bit. It says that some of the losses that you anticipate, which, of course, from Colstrip would exceed the

Boardman losses on the much longer line are reflected even though they are carried by companies not participating in the transmission study?

A That's correct.

Q What does that mean?

A Well, I believe that at this point in time, we had load flow studies assuming that the power was being generated at Boardman and load flow studies assuming that the power was being generated at Colstrip; and what we used in this study was the difference in losses between those two, and we assumed that the project would have to pay for those losses.

Q What's the reference to folks who are not involved in the study?

A Well, what we're saying is that we didn't try to determine upon whose system the losses would occur. We could have, but we still made the assumption, or implied the assumption that the project would have to pay for it. So we penalized the Colstrip project by that amount of losses which is a valid way of doing this sort of thing.

Q Whose systems might be paying for those losses, other than the four companies who were participants in the study?

A Oh, I have no idea.

Q Would they be other private utilities perhaps?

A Perhaps.

Q Bonneville Power Administration?

A Perhaps. Incidentally, there can be gains and losses both. The net was losses.

Q Okay. Now in your addendum statement, Mr. Labrie, you point out that when you did your comparison of a Boardman located plant and a Colstrip located plant that you did not escalate freight rates beyond 1975?

A That's correct.

Q Why didn't you?

A We just left it out at that point in time, and, of course, it favored the Boardman plant by doing that and the answer still came out that Colstrip was more economic.

Q At some points?

A What?

Q At some points it was more economic?

A Yes, and obviously, if we would have included escalation, it would have made a big difference and much more favorable towards Colstrip.

Q What I wanted to know is why you left it out and you said you just did leave it out?

A Yes, I can't recall except that we consciously left it out and said this is the minimum situation.

Q Okay. All right, sir, I'll read Dr. Chadwick's report; if you will be kind enough to see if you can find those other memoranda, I'd appreciate it.

A Okay.

HEARINGS EXAMINER: Let's take a recess while you do that, and Mr. Shenker we have Mr. Cox here and he has a written statement I'll give to you, too. Then perhaps we can either put him on after you finish Mr. Labrie or before, whichever you want. I'll give you a copy of his statement and you can make the decision on it.

MR. SHENKER: Thank you. Whichever you prefer, I'm going to have to read either Chadwick or Cox.

(RECESS AT 10:08 A.M.)

Following a brief recess, the hearing reconvened at 10:25 A.M. on February 12, 1976.

At this point, the testimony of Mr. Robert Labrie was temporarily interrupted to accommodate receiving the testimony of public witnesses.

RUSSELL J. COX, appearing as a public witness, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

HEARINGS EXAMINER: I've advised you, Mr. Cox, that we'll enter your written statement in the evidence of the record, but we won't have to re-read it then and re-transcribe it. You'll be asked some questions by Mr. Shenker of the Department of Natural Resources.

(THE WRITTEN DIRECT TESTIMONY OF MR. RUSSELL J. COX WAS DIRECTED TO BE INSERTED AT THIS POINT.)

TESTIMONY PRESENTED BEFORE THE MONTANA BOARD OF NATURAL RESOURCES HEARING ON COLSTRIP UNITS #3 AND #4 AT HELENA, MONTANA, FEBRUARY 12, 1976.

I am Russell J. Cox, representing Montana Associated Utilities, Inc., an association of Montana Rural Electric Cooperatives.

By resolution, our association supports construction of Colstrip Units #3 and #4. I am appearing here, today, to further emphasize that support, and to offer some of our thinking and observations regarding this very important matter.

In the 1930's, a noted American scientist proposed a new economic system under which the prices of all goods and services would be based on the amount of energy consumed in producing them. This concept, called "Technocracy," fell on deaf ears at that time. Perhaps many of the difficulties we face today would not have occurred at all, had we listened.

We might have developed habits, early, with regard to high energy consumption purchases. We are going to have to develop them, now, under the wrong conditions.

Hindsight serves no practical purpose, now. Unless we will learn from earlier mis-judgments.

What must concern us is the future. And in that regard, the energy picture projected by the engineering staff of the National Rural Electric Cooperative Association ... and presented to Montana's rural electric systems last Fall by NRECA Deputy General Manager Charles A. Robinson, Jr. ... is frightening, to say the least.

Our nation presently consumes 75-Quads of energy annually (75 x 10^{15}b.t.u.). Approximately 25% of that energy is delivered in the form of electricity.

NRECA projects that _if_ we triple present coal production by the year 2000, _if_ we maintain present levels of oil imports, _if_ by the year 2000 we mine 2.5-Billion tons of oil shale per year, _if_ we assume that in the year 2000 10% of our total energy is geothermal and 2% is solar, and _if_ we maximize domestic oil and natural gas production, 100-Quads of energy will be available in the year 2000.

That amounts to an annual energy growth rate of 1.5%.

Traditionally, however, our recent historic rate of growth has been about 3.5%, which means that, at that rate, we would require 200-Quads of energy in the year 2000.

NRECA has concluded that there is absolutely no way in which we can achieve that growth rate.

The very best we can hope for is an energy growth rate of 2.5%, 29% below recent historic trends.

To do that would require construction of 500 nuclear reactors of 1000 MW each. We would then have 130-Quads of energy available in the year 2000 ... or only 65% of energy requirements, based on recent historic growth.

What this adds up to is a series of truly dramatic changes in lifestyle which will be essential in the years immediately ahead of us.

Furthermore, instead of 25% of our energy delivered in the form of electricity, by the year 2000 one half of our energy supply will be in the form of electricity, 45% of that nuclear.

As you gentlemen well know, there are all kinds of figures available on our national and global energy situation. Many of them are in conflict, for they are based on different beginning assumptions.

NRECA believes its projections to be conservative. Supporting documentation is readily available if this board desires it.

Whatever data you might decide to accept, the inevitable conclusions must be:

1) There must certainly be some degree of energy growth;

2) We cannot possibly hope to continue consuming energy at previous levels, and therefore major economic and social changes must be made; and

3) Electricity's role in future energy consumption will grow not only in proportion to general consumption, but will be significantly broader in scope throughout our entire society.

We are already seeing conversions from natural gas and other fuels to electricity for household heating. Indeed, in many communities in Montana, the natural gas suppliers will no longer connect a new dwelling.

Conversions because of scarcity, and of price ... and normal growth of new families therefore add up to major load additions for electric systems. The old comfortable and traditional growth figures for electric systems are out the window, now.

It doesn't take an expert witness, or a massive study, to tell us that, already, demands on electric service in Montana are beginning to grow at a much more rapid pace than even in recent years. It's a matter of simple logic.

It has become increasingly difficult for electric utilities to serve their consumers without having even a dedication to service become suspect.

Electric facilities have always had to be scaled to meet potential peak demands. Indeed, a power supplier who did not make the effort to meet those peaks was failing his primary obligation to his consumers.

Earlier promotional efforts by electric utilities to fill in the valleys, by encouraging off-peak consumption, resulted in real efficiencies and actual savings to the consumers. With the on-set of the energy crisis, however, it became "un-American" to promote off-peak consumption. Thus, while electric rates have inevitably had to increase, along with everything else, as a result of inflation ... the loss of this off-peak efficiency has grossly exaggerated rate hikes in electric utilities.

Electric utilities increasingly find themselves in a "damned-if-you-do, damned-if-you-don't" position.

Electric utilities cannot force a consumer to insulate his home, or to wash with cold water. Indeed, we are criticized by many people if we use paid advertising to promote conservation.

Electric utilities have not, as yet, been given control over human conception. Yet if we attempt to expand to serve a growing population, it is the utilities which are condemned.

Electric utilities do not have the authority to deny a householder the right to purchase a color tv, a crock pot or a hair dryer. Yet the general public which purchases those items, and expects to be supplied the energy to operate them, grows increasingly wary of our efforts to meet the demands and the obligation they place on us.

We are, indeed, in the position of the man who was asked if he had stopped beating his wife. Our position is untenable. If we attempt to build to meet electric demands, we are judged wrong by those very people whose consumption requires us to build.

The present energy crisis exists in no small part as a result of the general glut of the American people. Each of us in this room, as consumers, bear a part of that responsibility. The very normal, human reaction to transfer "blame" to impersonal utility firms is an emotional cop-out which this Board, weighing the need for facilities such as the proposed Colstrip units, must ignore.

The energy crisis is a global crisis. There is no time for placement of blame. There is no time today, nor is this the proper forum, for global energy decisions and for positive actions to dictate lifestyle changes which must inevitably be made. What we must do, now, is to solve real energy needs of today. And work with dedication toward far broader decisions which will enable us to manage our energy resources responsibly.

Montana's rural electric cooperatives are united in the knowledge and conviction that the Colstrip units are essential. There is no other alternative. There is no time, now, as a result of delays in this deliberation, however well-meaning, to procede in any other direction.

And, gentlemen, it is my personal conviction that, whatever other alternatives might have been considered ... hydro, nuclear, or whatever ... similar controversy, delays and criticism would have been leved against the electric utilities of this state.

No one proposes Colstrip as the ultimate energy solution. Over the 35-year life of these plants, they are little more than a bandage we seek to apply while technology, and the mood of the nation, catches up to the challenge we all are going to have to face.

Condemning electric utilities for attempting to meet consumer demands is rather like suing a doctor for malpractice before he writes a prescription.

At a time when a complex and frustrating danger threatens, such as our impending national energy shortage, there is a tendency for people to grasp at seemingly "magic" solutions, without ever fully comprehending their meaning.

Solar energy is such an example.

On the surface, solar seems to be a meaningful solution. Experts in our field hope for as much as 5% of our national energy needs to be met by solar in the years ahead.

Achieving 5% of our total needs through the application of solar energy would appreciably reduce our day-to-day consumption of fossil fuels.

But what of those times when the sun doesn't shine, and electric utilities are pressed into service to provide stand-by service? What of that extremely cold spell in January, when electric systems are receiving peak demands from regular consumers, plus the peak demands from solar stand-by consumers?

Generation plants, transmission and distribution lines must still be built to accommodate those loads. It is the responsibility of each electric utility to prepare itself to serve just such demand peaks.

Widespread application of solar energy can only reduce the pressure on fossil fuel consumption. It does not reduce the pressure on utilities to increase generation capacity. It only adds to the essential need for more generation potential.

And let me point out two very real obstacles to the rapid implementation of solar energy, as the magic solution to our energy crisis.

The solar industry, itself, is wallowing in disorganization. Due to the lack of standards, loan approvals are presently being denied new homes proposed for solar energy. A year or more delay has been predicted by the National Standards Institute before basic criteria and specifications can be agreed upon.

Second, solar energy in the home is not going to result in a savings to the homeowner. Electric utilities already are aware of the need to re-structure minimum rates. In our region, fuel accounts for only about 15% of the monthly electric bill. It is realistic to expect that a home designed for solar energy would only reasonably be assessed the proportionate cost of generation capacity, transmission and distribution line costs, and maintenance, for basic stand-by service.

The 5% of our homes which might, some day, be served by solar energy will likely pay dearly for their contribution to conservation of fossil fuels.

These two economic facts will surely discourage widespread use of solar energy.

Those who promote such exotic alternatives to the general public, without disclosing all of the facts, do the people of this nation a great disservice.

Traditionally, our total energy consumption has grown by approximately 3.5% annually. I do not for one moment doubt that there is a need to conserve energy.

A number of conservationists point to 1975 to make their point, crying: "Look, there was a year when energy consumption only grew by 1%". But, at what cost? And why?

Massive unemployment. Economic turmoil. According to Senator Hubert Humphrey, this current recession has cost our nation $1.5-Trillion in goods never produced, services never rendered, and income never found in anyone's paycheck. A loss of over $7,000 for every man, woman and child in America today.

That kind of conservation we certainly don't want.

Following the Arabian oil embargo of a few years ago, many Americans did conserve. One Montana cooperative did a study of their system indicating that consumption per household was actually down about 10% in the year following the Arabian oil scare. But, at the same time, total system loads were up 10%.

We in the rural electrics are convinced that this nation can not possibly continue to consume energy at the traditional 3.5% annual growth rate, no matter what we do.

Conservation is obviously essential.

Conservation of energy is one of the basic reasons for the so-called Lifeline Rate structure currently being proposed. But, a few weeks ago in this building, Dr. Eugene Coyle, an expert witness on behalf of Lifeline Rates, offered testimony under cross examination before the PSC. It is a matter of public record.

Dr. Coyle indicated that the so-called Lifeline Rate structure probably would not conserve energy, because families are locked into existing appliances and lifestyles. It was his hope that a Lifeline Rate structure might tend to taper off individual families energy growth needs by gradually increasing energy cost along with increased consumption.

That conclusion seems to bear out another observation of the people of this nation. It has been said that the American people will live the very best lifestyle they possibly can afford on monthly payments.

While many people are making a conscientious effort to conserve, the vast majority are not.

The Montana cooperative I mentioned earlier also reported that, after the individual family drop in electric consumption immediately following the oil embargo, meter averages began to climb again. Per-home consumption averages are once again on the increase.

Those of us in the energy business are well aware of consumer waste. Serious efforts to conserve will be essential in the years ahead. Lifestyles are going to have to change.

But we still are going to have to build additional generation plants here in Montana, and across the nation.

Montana's rural electric systems are vitally concerned about the future of agriculture. Figures from the Department of Natural Resources indicate a tremendous boom in irrigation coming in just the next few years. Some 40,000 acres of powered irrigation is expected in Valley County, alone, according to those DNR figures. That is going to require energy. Energy to grow food to feed a hungry world. We cannot conserve, there, at the cost of starvation for human beings.

Nor can we build a wall around Montana, and solve only our own problems. Provide energy only for irrigating food Montanans consume, and let other people get along on what grows or doesn't grow dryland.

And if we build a wall around Montana, we will also shut out energy we presently import from outside. A number of Montana's rural electric systems import most or all of their energy from elsewhere. Cooperatives in this state own portions of generation plants in Washington and Oregon, and receive power from the Bonneville Power Administration.

Other Montana cooperatives receive at least some of their energy from North Dakota coal-fired plants.

And Montana's rural electric systems east of the divide receive approximately one-half of their energy supply from Montana Power Company. At present, our single hope for increased amounts of electric energy is from Montana Power Company.

If Montana Power cannot build, Montana's rural electrics will be unable to properly serve their own consumers.

Yes, conservation is essential as a part of solving future shortages. But who is to determine what is real need and what is waste?

To the little old lady who lives along, a few lights left on at night is security and peace of mind, not waste. To others, an electric blanket is not a luxury, but is essential. Is a lighted sign at a place of business a waste of energy? To those who might be out of a job if customers stopped coming in, that sign is essential. These are not determinations which electric utilities have any authority or moral right to make for consumers.

Before all other considerations, electric utilities have an undeniable obligation to serve. We don't determine how much energy we wish to sell ... the consumers tell us how much we have to deliver every time they turn on a switch.

If, as it appears, conservation will have to be enforced through some kind of rationing or control, this is a decision which must not be left to power companies to determine. It is a decision to be made by the people through their representative government.

Those who oppose Colstrip 3 and 4, saying that the energy is not needed, if we conserve, have their heads in the sand. You do not conserve by cutting off the energy supply. That only creates hardship. You conserve, or reduce consumption, by no longer selling hair dryers and crock pots and chord organs and color tv's.

There is absolutely no sense in allowing loads to build, and denying electric utilities the ability to serve those loads. The result can only be total chaos.

But closing down appliance factories and appliance stores, and shutting down the trucklines which haul those goods, would be equally chaotic.

We are talking about a problem, here, which is as broad and as complex as our entire global economy. This board is not going to solve the intricacies of world-wide inflation. This board is not going to end human suffering. This board is not going to materially affect the moral responsibilities of our people with regard to historic mis-use of energy.

But, this board can complicate inflation. It can add to human discomfort and suffering. It can undermine Montana's economy by failing to take its proper place in providing solid leadership in essential energy development and management.

To the question, "Are these plants needed?", there is only one answer. Yes.

To the question, "Is there any other alternative?", there is only one answer. No, not today. Not now. Not in the foreseeable future. Not in time.

Need is but one criteria. I recognize that you have other considerations as well. I strongly believe that your action must be to see that the Colstrip Units 3 and 4 are built to fill the need ... that they are built to comply as closely as possible with acceptable environmental standards. And that, if those standards are impossible to meet with today's technology, necessary compromises in those standards are made only to the degree absolutely necessary to assure the energy we need.

Montana's rural electric systems do not believe the question any longer is whether or not Colstrip 3 and 4 should be built ... but rather how quickly all of us, together, can see that they are built to the highest standards attainable with present day technology.

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EXAMINATION OF RUSSELL J. COX

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Mr. Cox, I understand from your statement that you represent the Montana Associated Utilities, Inc. here at this proceeding today. What is your employment when you are not representing them at this proceeding?

A I am managing editor of Montana Rural Electric News which is the publication of our association.

Q How long have you been employed in that capacity?

A One year.

Q Have you had any personal involvement as a manager of a utility company, sir?

A No, sir, I have not.

Q Have you ever worked for a utility company directly?

A No, sir, other than as communicator.

Q Have you been involved in other journalistic endeavors for the utility industry?

A I have worked with rural electric cooperatives and cooperative groups in advertising and communications efforts as a member of an advertising agency and in the media for approximately 15 years.

Q That would be practically all of your adult life?

A Pretty much.

Q So it is fair to say that your background, training and experiences are in journalism, advertising, communications, and public relations?

A Correct.

Q All right, sir. When did the resolution that you refer to in your statement by the association get enacted?

A The initial resolution was issued by our board of directors in,I believe,July of last year. I don't have the date available, but I could find it.

Q Well, the approximate is fine as far as I'm concerned, Mr. Cox. Your statement is dated February 12, 1976, which is today. I assume it was prepared sometime before today; would that be correct?

A Yes, sir.

Q Do you live in Helena?

A I live in Great Falls.

Q Now you make a number of statements in your prepared testimony which has been received here, Mr. Cox, with which the opponents to the Colstrip project are in strong agreement. But I want to make sure that I understand the implications of your statements as well. In the fourth paragraph on the first page, you say we might have developed habits early with regard to high energy consumption purchases. And, I take it, what you mean by that is that if we had foresight back in 1930 or so, we might then have begun to develop habits earlier than we are now going to have to develop them?

A Correct.

Q And, of course, later on in your statement you explain time and again why it's necessary to develop those habits and, basically, what you refer to by those habits are high energy consumption is a bad thing when it's untrammeled and unreasonable, right?

A Yes.

Q Now you point out the national statistics that have been forecasted by the National Rural Electric Cooperative Association with a 1.5 percent annual energy growth rate for the entire country based upon the increase from which you call presently consumed energy to the scenario that you project on page 1 of your statement for energy production in the year 2000. Does presently mean fairly current statistics, like 1975?

A Yes, 1975 statistics. The source of that data, I understand from the NRECA people that I talked to earlier this week, is primarily senate and house reports and studies on the problem.

Q These are projections, of course, that make a number of assumptions as to what kind of production of energy will occur in various sectors; and assuming all of those sectors are met, then you've got a mix which at the end would result in a 1.5 percent annual growth rate, right?

A I think what Mr. Robinson is saying is that this is the maximum that could be achieved if all of these things are done, and some of them we don't, apparently, want to do, such as importing oil.

Q You've anticipated my next question that, in fact, what these statistics project is a maximum growth rate of 1.5 percent and an unlikelihood that that rate would be reached; isn't that correct?

A In all probability it would not.

Q Okay. Obviously, therefore, if 1.5 percent annual growth is not going to be reached, then 3.5 percent, which has been a traditional historic rate of growth nationally, is just out of the question, right?

A This is our position, yes, sir. Now the 1.5 percent rate which they say can't be reached, let me qualify that by going back to Mr. Robinson's statement. He says that the alternative he sees in the immediate future is massive nuclear development which, again, is going to fight opposition in being implemented.

Q Well, we're not here today to determine by a grass roots poll which is the most opposed of the alternatives that might be available; we're here today to examine this particular alternative on its merits as considered with others, and I take it that's what you thought your function was in preparing the statement; was it not?

A Correct.

Q Sure. In the view of the client whom you represent today as a communicator, as you put it, Mr. Cox, the very top maximum growth rate that you can hope for is 2.5 percent or a 29 percent reduction from where it used to be?

A Yes.

Q Now I'm interested in the words hope for? Isn't that inconsistent with the position that you take on the necessity for changing those habits, to hope for large rates of growth in the consumption of energy?

A We're not hoping for large rates of growth. We are looking at traditional energy consumption habits, much of which we admit is perhaps waste or glut or misuse. We are looking at a pattern in the past that does not seem to be tapering off, and we are looking at a goal that we are saying that we cannot attain. We are saying, sir, that we're scared to death.

Q These are difficult times, aren't they? Now, Mr. Cox, you have some good things to say by implication about the value of filling in the valleys among the peaks in energy supply when it's most demanded. That's still a good thing to do in your view, is it not?

A That's a difficult question to answer. If we are talking about meeting a very real crisis of some years down the line in energy, we must conserve as much as possible and we must back away from promotional sales. That is good in that context.

Q But load management by which you level out your peaks is good in the other context?

A If we level out the peaks and become more efficient, this is also good in terms of what I'm paying out of my pocket for my light bill this month.

Q And that's called load management by the utility industry, isn't it?

A I believe so.

Q Right. In the third page of your statement, Mr. Cox, the sixth paragraph down, you point out the position which you regard as untenable in which anyone can ask you if you had stopped beating your wife; but wouldn't it be a more correct statement for the record, sir, that if you attempt to build to meet electric demands, you will be judged wrong if you are wrong in your judgment on the electrical demands?

A I am not czar of the energy industry. For myself I would say this; I would much rather be judged wrong for overbuilding than to be judged wrong for failing to supply the energy that the people would need.

Q What if there were a third alternative and that were not to overbuild or underbuild? Wouldn't you rather be judged right for doing that?

A Certainly.

Q And as between overbuilding by a little bit, or overbuilding by a lot, you would rather be judged less wrong by overbuilding a little bit, wouldn't you?

A It is essential to overbuild to some point. Now Franklin Zarb has stated that it is the belief of the Federal Energy Agency that we must attain at least a 20 percent margin in generation capacity over our peaks to allow for down time, maintenance of generators,and so forth.

Q Isn't the reserve capacity, in effect, overbuilding? Isn't that what reserve capacity is for?

A Fine, I'll accept that.

Q Okay. And in all the demand projections which you have seen from the utility industry, they include reserve capacity in their actual demand projections; don't they?

A Yes, they'd better.

Q Now you refer in your statement to Colstrip as little more than a bandage on the energy crisis; that's an interesting term, and you point out that during the proposed life of Colstrip, you want to seek to apply technology as it develops. Would I correctly infer from your statement, Mr. Cox, that you and the client for whom you are communicating here today would be interested in applying that technology which most efficiently and effectively delivers energy to consumers?

A I'm not too sure that we're going to have a great deal of options as far as let's pick the most efficient or the most effective. I think that we're in a -- it is my feeling that we're in a position now where, in this region particularly, there are no alternatives. While the rural electric cooperatives have endorsed Colstrip 3 and 4, they did so in their resolution stating that it was their belief that there was no other possibility that could be built in time. Now a more efficient option might have been to build a dam on the Missouri which takes far longer to implement and build and there is no time to do that.

Q Oh, really? How long does it take to build a dam on the Missouri?

A Some 20 years.

Q Twenty years, yes.

A When you're going through siting, land acquisition and construction.

Q Okay. Have you studied that?

A Have I studied building a dam on the Missouri? No, sir.

Q All right. What other alternatives that might be efficient did the resolution consider?

A The resolution, which was drawn up by our board of directors and by professionals in the energy industry, was based on their agreed view that there simply was not time to implement any other alternative.

Q Which ones were considered?

A I don't know that I was privy to that board meeting, but I do know that we have considered and we are involved in nuclear. I know that we have been concerned about closing off potential generating sites on rivers. We are seeing in the industry nationwide our options shut off time and time and time again.

Q Do you know whether the board considered an alternative of a different site for the generation of power?

A At that point, with the lead time required and with the paperwork, hearings, and so forth involved, even last year it was our conviction that another site would not be possible.

Q How about a site that's already under construction?

A I'm not aware of a site that's already under construction, sir.

Q Were you not aware, Mr. Cox, that some of the applicants in this very proceeding are sponsors of projects which have hundreds of megawatts unallocated at this very moment for thermo-generating units that will come on line in 1980 and thereafter? Were you not aware of that?

A I am not aware of that, sir, and I'm not too certain that, according to my understanding of -- are you talking about nuclear now?

Q Nuclear and coal?

A It's my understanding that nuclear plants which are under construction, some of which our people are partners in, have been stymied.

Q I take it you are not privy to the agreement of January 23, 1976, reached by some private investor-owned utilities with respect to rearrangement of resource allocation and unallocated power from major generating stations?

A No, sir, I'm not privy to that agreement.

Q Now back to the question that I asked you before, prior to our getting off on this interesting conversation about technology. It is correct, is it not, that the technology which you seek to apply after the bandage of Colstrip is applied, would be the kind of technology that will develop more efficient and more effective conversion of energy and transmission of energy and distribution of energy? Isn't that true?

A Certainly; we'd all hope for this?

Q You have, of course, a journalistic background and you have some good felicitous phrasing in here I wanted to ask you about. On page 4 of your statement, the fourth paragraph down, you say that comdemning utilities for attempting to meet consumer demands is rather like suing a doctor for malpractice before he writes a prescription. Now wouldn't another analogy that would be apt, Mr. Cox, be that electric utilities who attempt to meet consumer demands unrealistically high should be as guilty as a doctor for malpractice when he attempts to treat what a patient doesn't need?

A Once again, sir, I believe that I've covered that in my statement. I don't think there has been a mandate to the utilities that we control the sale or use of crockpots.

Q But, Mr. Cox, as you point out quite clearly in your statement, the demands on which the utilities have made their projections in the past cannot be the demands on which the utilities will make their projections in the future. Now that's true, isn't it?

A Yes.

Q And did you know, Mr. Cox, that the demands projected by the applicants in this proceeding are substantially in excess of the highest possible growth demands you can forecast in your own statement?

A No; in applying Mr. Robinson's data to Montana's situation with our coal reserves, with other potential energy sources here such as hydro, I cannot say that our energy growth here couldn't in Montana, or in any given county of Montana, could not vastly exceed this. These projections are national projections, and there are some areas that are energy poor. Our potentials here are far greater than some other places.

Q Is the Pacific Northwest energy poor?

A It is rapidly getting that way.

Q Is it now?

A Is it now, today? No, the lights are on, sir.

Q As a matter of fact, there's a 20 percent surplus capacity in the Pacific Northwest over the last three months; isn't that true?

A Now Franklin Zarb would disagree with you, sir; however, I think the surplus capacity you're talking about has something to do with the rather mild winter.

Q Do you know of any time since 1932 over a period of more than three days in which the Pacific Northwest has not had the very top peak capacity to meet every demand placed upon it?

A I understand, and this is heresay, that the bureau and BPA have been operating hydro plants at well over rated capacity this very year.

Q That's common, isn't it?

A I wouldn't say it's common, no. I don't think the people running those plants are feeling terribly confortable about it.

Q They've been doing it for years, haven't they?

A This is not my understanding, no, sir.

Q Oh, I see. Well, let's move to the area of solar energy, to which to devote a fair amount of your statement, Mr. Cox. I was a little bit confused in putting the various paragraphs together in the once over reading that I've given to your statement. Would I correctly infer that you think it's a good thing to use solar energy as one of the conservation measures that should be taken for our society?

A Definitely.

Q And if solar energy is properly applied, you would agree, I take it, with the projection of the experts that 5 percent of national energy needs would be met by solar in the years ahead?

A I have heard figures ranging from 2 to 5 percent.

Q Okay. You'd accept the ones you have in your statement?

A Fine.

Q All right. Now did you know, Mr. Cox, that according to Mr. Goldhammer, who testified here on behalf of the applicants as the immediate past power manager of the Bonneville Power Administration, there is no forecasted deficiency in peak supply of power for the Pacific Northwest between now and 1990? Did you know that?

A I am not aware of those figures, no; but this is not my understanding of our situation in Montana.

Q Okay. Talking about conservation in another sense, Mr. Cox, are you aware of the percentage reduction in demand effected in the Pacific Northwest in November of 1973?

A No, sir.

Q Does the figure 11 percent decrease in demand strike you as a high figure?

A For 1973?

Q In November of 1973.

A Not necessarily; I'd have to know what some of the causative factors were. It isn't a startling figure to me.

Q Good. Now you state, Mr. Cox, on the sixth page of your testimony that we cannot build a wall around Montana. May I ask you, sir, did you know that the state of Montana as a whole is a net exporter of energy by a factor of many times what it imports?

A I think that's a deceptive figure, sir.

Q Is it true?

A It is true, for the most part. It is not necessarily true of that at any given hour of any given day. However, I think that the people that use that data and talk about us being a net exporter without explaining the vast amounts of federal power that are contracted and not available to Montana and are not within our control result in this exporting are deceiving the public. Are you aware of the fact, sir, that numbers of rural electric cooperatives in Montana are buying into nuclear plants in Washington and Oregon? Are you aware of the fact that we are, in fact, importing a good deal of our power?

Q Mr. Cox, I'd love to be able to answer you questions, but the problem is that you're sitting in the answering chair and I'm sitting in the asking chair, so for this proceeding, I'm afraid I'm going to have to ask the questions and you supply the answers. Now the exporter of power, which is the state of Montana, of course, at no isolated moment and time, need always be the exporter. But that's true of every utility and every system because there are fluctuations in the system and in each company; isn't that true?

A Yes.

Q All right. But there are companies which are exporters or importers, depending upon the period of time that you look at what they're doing?

A Certainly.

Q And in the utility industry, the index most frequently used is an annual view; isn't that true?

A That depends on what you're trying to prove and what the basis for the data is.

Q Have you ever heard of the West Group Forecast?

A No, sir, I haven't.

Q All right. In your statement, also, Mr. Cox, you refer to the purchase of energy, or the delivery of energy, from North Dakota generating stations by Montana cooperatives. Are there other Montana utilities, other than the Montana Power Company, that is, which also supply power to the cooperatives?

A I'm sorry, are there other private power companies and utility companies?

Q Yes, sir.

A I'm not sure whether any other IU's are wheeling to our members or not. A good deal of negotiation for power is now handled through our G and T cooperatives. We may at times through interties be purchasing power, but our long term contracts are with Basin Electric in North Dakota, with Bonneville, with the Bureau of Reclamation, and with the Montana Power Company.

Q Now Basin Electric is one that is also involved in the building of a generating station in Wyoming; isn't it?

A Yes, sir.

Q Are any of your cooperatives' negotiations with the generating station in Wyoming to see if they can buy some of that power?

A This already is in the works and if and when that plant is constructed, this will be a part of our power plan.

Q Good. I take it there's sufficient system interconnection to get the power from the Wyoming generating station to the Montana cooperatives then?

A Now how the wheeling arrangements will be arranged, I don't know. It can be handled.

Q Sure.

A However, our G and T's still are relying on Montana Power Company for their growth energy source in the years to come.

Q Did you know, Mr. Cox, that tomorrow there will be announced in Wyoming the building of new 1500 megawatt generating stations? Did you know that, sir?

A New plants in addition to the Wheatland plant?

Q Yes.

A No, I'm not aware of that statement.

Q Now you also state, Mr. Cox, that conservation is a decision which must not be left to power companies to determine; it is a decision to be made by the people through their representative government?

A Yes, sir.

Q Would you include the Board of Natural Resources and Conservation as part of that representation of the people?

A I am not too sure, speaking for myself, that the Board of Natural Resources always is fully representative of the people. I am talking about legislative action; I am talking about conservation, or some kind of enforced rationing which I think is going to have to come about someday if we in the business are not allowed to educate, and it's become un-American to educate, to spend money to educate. I would be very wary of having that kind of control, that kind of direction, that kind of power over basic energy consumption, other than legislatively controlled.

Q Would you consider that the statutory enactments of the legislature are appropriate legislative control?

A Certainly.

Q Now you put the question, Mr. Cox, as whether the plants are needed, and I take it the answer to your question, as you put it in your statement, is that the bandaid ought to be applied, right?

A Absolutely.

Q Now if, Mr. Cox, that need were not there, you wouldn't want to apply that bandaid, would you?

A If the power were not needed, the rural electrics would not be supporting these plants.

Q Well, I thought I would try it and see what would happen. We had some folks in here yesterday and the day before and they didn't like the assumptions that I asked them to make. We've got sort of a rule in this proceeding that if you are asked a hypothetical question, you're supposed to accept the assumption rather than fighting the assumption. Now I'll ask you to make the assumption that the power is not needed in the time frame that is proposed in this proceeding. If that were true, are you willing to accept that assumption for the purposes of the question I'll put to you?

A If that were true, I would not support the Colstrip plants.

MR. SHENKER: Okay. Nothing further. Thank you very much, Mr. Cox.

HEARINGS EXAMINER: Thank you very much, Mr. Cox. You are excused.

(WITNESS EXCUSED)

HEARINGS EXAMINER: How do you want to proceed now?

MR. PETERSON: Mr. Hodder.

HEARINGS EXAMINER: Mr. Hodder? Mr. Mahoney, are you in any hurry?

MR. MAHONEY: No.

HEARINGS EXAMINER: Fine. We'll let you listen and practice up then.

RICHARD HODDER, appearing as a public witness, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

(THE WRITTEN DIRECT TESTIMONY OF MR. RICHARD HODDER WAS DIRECTED TO BE INSERTED AT THIS POINT.)

TESTIMONY OF RICHARD HODDER

I am Richard Hodder and reside at Route 2, Box 202, Bozeman, Montana. I was graduated in 1947 from the University of Idaho in the College of Forestry, and specialized in Range Management and Wildlife. I have worked for the United States Forest Service and as State Range Biologist for the Montana Department of Fish and Game for 8 years. I have worked for the Northern Pacific Railroad as Supervisor of Grazing and Cultivation for their land department. This work included analysis of the grazing capacity of its range units, as well as land timber sale operations.

In 1963 I was employed by the Montana Agricultural Experiment Station at Montana State University, Bozeman, Montana, in the Animal and Range Sciences Department as a member of the faculty, and am presently Senior Research Associate.

In 1964 I began working on reclamation of roadsides in Eastern Montana on the Interstate Highway System, many of which traversed coal fields. The main purpose of this work was to reclaim the roadsides and slopes to eliminate erosion and beautify the highway system. Many roadside problems are similar to mine spoils reclamation problems.

In 1967 I approached Mr. Paul Schmechel of Western Energy Company regarding reclamation of spoils which had been left from previous strip mining efforts at Colstrip. This led to a contract in 1968 with Western Energy Company and M.A.E.S. to conduct research with the objective of developing a comprehensive reclamation program that would ultimately result in restoration of mined lands to its pre-mining use or a higher use.

The research effort first was to try to approach spoils problems from an agricultural science point of view by planting grass seeds on small plots. A large number of the species (wheatgrasses, indian rice, prairie sandreed, bromes) responded fairly well. Shrubs planted included sages, rabbitbrush, winter fat and four-wing saltbush. Weeds, such as wooly goldenaster and sageworts, were also planted. Sweetclover, alfalfa, cicer milkvetch, sainfoin, curly cup, gumweed and prairieclover, were some of the species planted.

We went from that effort to striking ridge tops from old spoils exposing new surface and revegetating the soil in a number of different ways. This effort proved reasonably successful.

Following this, we reshaped old spoils and planted on various exposures and gradients to determine their relative productiveness. The individual study plots were primarily limited to thickspike wheatgrass, while broad mixtures, including native species were planted on the remainder of the study site. This worked very well and is now the oldest remaining large seeding in the Colstrip area.

Since 1969 it was fertilized perhaps four times and now approaches self-sufficiency.

In 1970 we began our first work on new spoils at Western Energy in the eastern end of Pit 6. The main thrust was to evaluate production on topsoil as compared to sub-soil and with raw spoils. We used Cheyenne winter wheat as an indicator species to reflect production and then applied several mulches on top of the seeded treatment. We substantiated that the topsoil produced the best crop, the sub-soil next best and raw spoils last. But we learned that raw spoil with wheat straw mulch produced equally as well as topsoil. This indicated that alternative approaches are available to revegetation establishment when topsoil is not available.

In 1971 and 1972 we prepared our first large scale pasture seeding. This involved surface manipulation treatment to control erosion and increase infiltration of water into raw spoils. This acreage is presently included in cow pasture.

Also, in 1972, our main thrust was a Plant Community and Succession Study on 11 acres south of the Western Energy tipple. This was the first area treated by using reshaped raw spoils with a thick coarse texture buffer layer placed on top of raw spoils to absorb precipitation. Available topsoil was placed on top of the buffer layer. The entire area was broadcast seeded with a varied grass-shrub mixture and stabilized with wheat and Sudan grass to prevent erosion. This system worked very successfully and is the system presently used now except on steep slopes. Under present reclamation regulations salty or inhibitory spoils (non-support grass cover) must be covered with eight feet of non-inhibitory sub-soil on which topsoil is placed to allow desirable vegetation to establish itself.

In Spring 1972 our main effort was topsoil study. We had Western Energy construct a long ridge so as to have a series of plots all of one consistent gradient and exposure on which we placed different varying depths of topsoil. All of the variable depths were seeded to wheat as a production indicator. We learned that topsoil deeper than 4 inches did not increase production or plant response. The other phase of the topsoil study was with variable gradients, where the Company built three large ramps of 2½ to 1, 3 to 1, and 4 to 1 gradients. All three were equally topsoiled and seeded to Lincoln brome grass and four-wing saltbrush (shrub). The annual stabilizing species used was Sudan grass. This grass came up very quickly, stabilized the topsoil and produced a very heavy cover of mulch through which the perennials grew and formed a complete cover the second year. This is what we anticipated and the effort was considered extremely successful.

In 1973 we also tried a lot of new species under the new reclamation law to determine what would establish best. This effort was not successful because fall seeding did not protect the topsoil through the winter and the topsoil eroded from many plots and inundated other plots. This points up the hazards of topsoiling at the wrong time and emphasized the need to protect the topsoil in a broad area, or, in the fall, to protect the topsoil with mulches. A proper method is to put the topsoil in place in the spring immediately prior to the rainy season, so roots can take hold to prevent erosion. As an alternative, seeding in the fall can be done by stabilizing the soil with annual temporary stabilizers such as barley. Either effort is now in common practice and works successfully to prevent the erosion of the topsoil.

Another hazard of topsoiling concerns weeds. Topsoil is a store-house of desirable perennial native species, as well as a bank of undesirable weed species. The challenge is to use the topsoil in a manner whereby one can gain the advantages as opposed to the disadvantages. If this is not successfully done, a weed cover results and it becomes very difficult and costly to eliminate. Weed control is essential and is obtained through timing and shading the topsoil with desirable temporary stabilizers. An effective fertilizer program may promote perennial species, but may temporarily benefit weed development even more.

The purpose of fertilizing in reclamation of spoils is to develop and incorporate as much organic material in the surface of the spoil as is possible. Organic matter production is essential to initiate a soil development process. A developed soil is necessary to sustain a vegetative cover over a long term.

Spoils are notoriously sterile and contain no significant available nutrients. Plant foods must be replaced when consumed and the most efficient manner is through chemical fertilizing. Repeated spoils analysis show that nitrogen and phosphorus in combination are the key plant nutrients necessary to produce rapid plant growth. Potash is present in spoils and can become transformed into a useable form.

Research work has substantiated the need for fertilizing preferrably after seedlings emerge, in order to promote rapid root penetration deep enough to reach moisture that will sustain the plants through the first dry season. The rates of fertilizer applied vary with the species and purpose of the planting, but approximately 50 pounds of available nitrogen (N) and 50 pounds of available phosphorus per acre are sufficient to establish and maintain good cover. Fertilizing may be necessary for several seasons in order to develop a good cover of mulch to protect the soil surface and to incorporate sufficient organic material into the upper spoils layer to initiate a soil development process. Depending on the cropping system used, continued fertilizing may be necessary. The impact of fertilizing can be demonstrated by the fact that a barley seeding without fertilizer has produced four bushels per acre, while with moderate fertilizing, 40 bushels per acre has been achieved. With grasses, fertilizer requirements vary with every species in the mixture, and to be specific each species must be known. We are striving to create a balanced situation, but soil development is an extremely slow process and thus it may take many years to achieve self-sufficiency. However, indications such as soil micro-organism activity and organic material accumulation suggest that the soil development process is progressing much faster than anticipated.

The success of any reclamation project is clearly dependent on an effective management program. Therefore, the purpose of reclamation, to be realistic, must be keyed to the needs of adjacent ranchers or lessees who will utilize the reclaimed acres. By State Law the purpose of reclamation is to grow native grass and that is one purpose of the program in reclamation at Colstrip. Alternatives to native grasses are being studied, but are experimental only and do not constitute a planned development at this time. In fact, when we work with temporary stabilizers of topsoil, we in effect are working with alternate crops and thus we incidentally are learning other potentials for spoils use.

Applicants' Exhibits 78A, 78B, 78C and 78D are progress reports prepared under my direction and control as project leader of the reclamation research project at Colstrip. Exhibit 78A details the first substantive local report on reclamation and includes an inventory of all species and description of each such project for the 1970-1971 season. Exhibit 78B is the 1971 progress report and shows the changing situations. For example, Exhibit 78A deals with old, unshaped spoils, while 78B, 78C and 78D deal with the problems and results of the present mining activity. Exhibit 78C is the 1972-1973 progress report, and 78D is the 1973-1974 report.

Another facet of coal reclamation is surface manipulation. This innovation was developed at Colstrip and involves roughing of the soils surface to minimize erosion and increase infiltration. The configuration or pattern is determined by the slope, texture and anticipated rainfall which must be controlled. Offset listering, gouging and basining are three effective patterns employed. An example of gouging is shown in the photograph on Page 20 of Exhibit 78D. This Exhibit describes the technique beginning at Page 8. Gouging consists of making small pits which are efficient in holding water on the lessor slopes (See photograph on Page 10 of 78D), whereas basins are large depressions conducive to steep slope stabilization (bottom photograph on Page 10 of Exhibit 78D).

Tests have shown that surface manipulation is effective in conserving moisture that would otherwise have been lost. Increased moisture retention promotes increased vegetative production -- one of the purposes of the reclamation process. The surface manipulation process will not be applied wholesale to reclamation efforts because under some circumstances, topsoiling and applying buffer layers as required, do not make it necessary except under extreme conditions.

In conclusion, reclamation at Colstrip is working and has exceeded our expectations. It has produced a workable, effective system for reclaiming mine lands in Montana. While advanced methods will be devised, reclamation at Colstrip demonstrates that methods are effective and presently in use to minimize erosion, reduce pollution and other problems caused by strip mining. Thus, the fuel to be used at Colstrip Units 3 and 4, mined from Areas C, D and E, will but briefly adversely affect the land use due to mining. In fact, I feel reclamation of strip mined lands will increase the agricultural potential of Eastern Montana.

MR. PETERSON: At this time, Mr. Davis, the applicants would move into evidence Applicants Exhibit 78-A, 78-B, 78-C, and 78-D.

HEARINGS EXAMINER: Is there a 78 and a 78-A or does it just start 78-A?

MR. PETERSON: 78-A.

HEARINGS EXAMINER: Very well, you may cross-examine, Mr. Shenker:

EXAMINATION OF RICHARD HODDER

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Mr. Hodder, I'm only going to have a few questions for you today, sir. As I understand it, the limit of your activities in the Colstrip area is on reclamation; is that right?

A That's correct.

Q And just for your information, sir, the relevance of that question to the issues before us is only on the extent to which the presence of the Colstrip units or the transmission lines will affect reclamation. You haven't gotten into that issue, have you?

MR. PETERSON: I'll object to that as being an incorrect statement of the record and of the law.

HEARINGS EXAMINER: Well, he can answer.

A Would you please repeat the question?

Q Sure. Have you gotten into the issue of the extent to which the Colstrip units and the attendant facilities will affect reclamation efforts?

A To some extent, yes.

Q How?

A By studying the base line situation, vegetation-wise, animal-wise in the Colstrip area, and by incorporating assurances into the reclamation program, that is broad species, various types of methods, which in effect would take care of various happenings because of the existence of a plant there.

Q Well, you don't know what the happenings will be until the plants come; isn't that right?

A That's why we're using alternate approaches in the reclamation system.

Q Yes. In any of the exhibits which you have before you there, Mr. Hodder, do you refer to the Colstrip units 3 and 4 and what their effects will be?

A No.

Q Okay. Now in the statement which you've furnished for us, Mr. Hodder, if you look at page 2; do you have the statement there?

A Of my testimony?

Q Yes, sir. Page 2, line 21, you state that since 1969, you have fertilized it, which I assume is study plots; is that right?

A This would be a specific study plot, no doubt, which is referred to earlier somewhere.

Q Well, in any event, the fertilizing you've done is some four times since 1969, and whatever it was you fertilized is now approaching self-sufficiency; is that right?

A That's what I said, yes.

Q Yes. So that would be between 1969 and 1976, a period of seven years, you've fertilized four times and it's now self-sufficient or almost?

A Yes. Now this may apply to this one case referred to above. However, we fertilize most things at the time of seeding or immediately after.

Q On an annual basis?

A No, when we are seeding perennials, we seed them once and we may fertilize them once during the establishment period, and then some of them are fertilized on an annual basis, some of them are not. So we have various types of fertilizer programs.

Q Let's take a look at some rate of fertilizer application. On page 5 of your statement, you refer to the application of fertilizer varying, of course, with the species and purpose for which you are doing the fertilizing, but you've used approximately 50 pounds of, I assume that's available nitrogen, and 50 pounds of available phosphorus per acre in order to establish and maintain good cover?

A Yes.

Q Can you give me those figures in bulk terms?

A Yes, 50 pounds of available N --

Q N being nitrogen?

A N being nitrogen. Nitrogen in a fertilizer form is 1/3 available, so that would be 150 pounds of N and filler to make what is called a commercial fertilizer. I think that's what you mean.

Q That would be 150 pounds of what is commonly called bulk fertilizer per acre?

A Yes.

Q All right, and how about available phosphorus?

A The phosphorus is about 48 percent available of P_2O_5 and so the rate would be about 100 pounds.

Q That would be 100 pounds in bulk per acre?

A Yes.

Q Now on the next page of your statement, page 6, line 15, you point out that the purpose of reclamation, to be realistic of course, must be keyed to the needs of adjacent ranchers or lessees who will utilize the reclaimed acres. Have you, Mr. Hodder, engaged in any effort to chat with the ranchers in the area to see what their needs are?

A Yes, indeed.

Q Good. Are any of those ranchers members of the Northern Plains Resource Council?

A I'd say a good many of them must be.

Q Good. Can you give me some names, please?

A Tom Wimar.

Q Tom what?

A Wimar, W-I-M-A-R. Don Schneider, Wally McRae.

Q Wally McRae; it seems to me I recall that name. He is still called McRae, though, I take it?

A As far as I know.

Q Okay. Have you followed his advice as to what his interests are, what his needs are?

A I haven't talked with Wally about reclamation, that is on the site, for quite awhile, and by quite awhile I mean several years.

Q What other names can you give me, sir.

A Now you asked me which belong to the Northern Plains Resource Council.

Q Well, of course, you may not know whether they all belong to the Northern Plains Resource Council so just give me the names as you recall them?

A Well, other people that I've talked with in the area.

Q Oh, excuse me. You've now given me all the names you can recall of people who are members of the Northern Plains Resource Council?

A I think all those people I mentioned and Don Bailey I'm sure would be, too.

Q Do you recall what his advice as to what his needs are?

A Now I wouldn't call it advice; I asked them what their interests might be as far as reclamation purpose is concerned, or results.

Q What do you do with that information when you have it?

A I apply it to reclamation planning and the absolute importance of having input from local ranchers into reclamation planning in order to make the reclamation work and make it permanent.

Q I'm interested in that. You say it's absolute importance; would that mean that if you didn't have their input, that you couldn't properly do the reclamation planning?

A For some purposes, surely you could.

Q Surely you could or could not?

A You could.

Q I still don't know whether there is a not on there? Yes or no?

A It depends on the purpose you have in mind. If you want to build a housing development, we wouldn't need the rancher input.

Q Okay. But for putting grass cover or other seeds or other perennials into the soil, you might want to get the rancher input?

A I have talked with various ranchers to find out what species they might of thought would be most useful to them in the future, whether or not they would want a grass cover or a crop cover or whatever.

Q Good. Now you gave me the names of some folks from the Northern Plains Resource Council. Do you have any names of folks other than those who might be from the Northern Plains Resource Council?

A Nolan Fandrick.

Q Give that to me again?

A Nolan Fandrick.

Q Nolan Fandrick.

A Clair Streeter, Mr. Wilson, Lee Wilson from Absarokee. Is this too far away?

Q No, if it's not too far for you.

A Names don't come to me very well. Maybe that will suffice, I don't know.

Q Then, Mr. Hodder, in your statement you conclude by referring to the fuel to be used at Colstrip units 3 and 4 mined from areas C, D, and E. How do you know what fuel is going to be used for units 3 and 4?

A I presume that the plans that are on hand will be followed.

Q What plans?

A The Montana Power Company, or Western Energy Company, plans.

Q What plans?

A Perhaps the plans in the Westinghouse paper.

Q Well, didn't somebody tell you that some fuel was going to be used at Colstrip units 3 and 4 from areas C, D, and E?

A I have heard it from many sources, but I can't put my finger on any one source at this time.

Q What if the fuel to be used at the Colstrip units 3 and 4 did not come from areas C, D, and E? Would that make a difference to you?

MR. PETERSON: I'll object to that, Mr. Davis, on the grounds that it's irrelevant because the testimony is overwhelming in this case that that is just exactly where the fuel is coming from, and when you ask the witness different, it's attempting to mislead the witness and is irrelevant.

MR. SHENKER: There are some doubts in the record as to where the source of the coal will be, and I'd like this witness to tell me whether it's relevant to him.

HEARINGS EXAMINER: I'll overrule the objection; you can answer whether it would make any difference to you or not in your planning.

A It doesn't make any difference to me where the coal comes from.

Q Why did you put that in your statement then, sir?

A Why did I?

Q Yes.

A I don't understand.

Q Take a look at the last page of your statement, the next to the last sentence, at line 7. If the source of the fuel and the area from which it comes is irrelevant to your statement, why is it there?

A Well, right off hand I have no reason for why it's there.

Q Who wrote this statement, Mr. Hodder?

A Well, I answered questions.

Q And someone else wrote it?

A I have no idea who typed it.

Q Well, did you prepare it in this form?

A As I recall, I answered questions.

Q And someone took the answers and wrote them up in the form that this statement now appears?

A I believe that's the way it was done.

Q Well, do you know when it was done?

A No, I can't say exactly when it was done.

Q Well, was it within the last month or the last year?

A It was within the last month or two, yes.

Q Let me see, Mr. Hodder, if I understand. From the last time we had a chance to visit with you, it was then the case that you had had no field experience with respect to the measurement of the affects of sulfur oxides, hydrogen flourides, nitrous oxides, suspended sulfates, or sulfur compounds on vegetation; is that still the case?

A Yes, that's the case.

Q And it was also true then that you had had no laboratory experience; is that still the case?

A Personally I have not.

Q All right. It was also then the case that you had not undertaken any cost benefit analysis with respect to the use of the land before and after reclamation; is that still true?

A Yes.

Q It was also the case then that you had made no analysis of the affects of transmission lines on reclamation; is that still true?

A That's true.

MR. SHENKER: Nothing further. Thank you, Mr. Hodder.

Cross, by Applicants

By Mr. Peterson:

Q Just a couple of questions, Mr. Davis. It's a fact, is it not, Mr. Hodder, that this statement was worked in corroboration with me?

A That's true.

Q And you were then sent a typed copy of the proposed statement for correction and review?

A That's right.

Q And you made corrections and returned it for final typing to my office?

A That's right.

Q And so it's no secret that I helped you prepare this statement?

A Not at all.

Q But you do stand by the statement as, and the substance of this statement, and those matters that are contained therein?

A That's right.

Q Now with regard to the local efforts that you make in contacting the ranchers, what is the purpose of that?

A I'd like to clarify one point from the previous question about people contacted.

Q Fine.

A It's only been perhaps within the last year or year and a half that I've made a point of talking with ranchers to find out what their involvement has been, or what their interests have been in reclamation of proposed mine sites. I'm very much amazed that most of the ranchers just haven't given a thought about their involvement, future involvement in this, or their need to be involved in it. I think that because our law reads the way it does, that we are missing the boat a little bit in not having the rancher input as a part of the preplanning of reclamation because I think it's extremely important.

Q And that is the policy which you are now pursuing?

A I am trying to push this point so that perhaps in the future the law will be adjusted so that farmers can have an input into the purpose of reclamation.

Q And you consider that to be a desirable end?

A I think it's an essential end to make reclamation permanent, or give it long life at any rate.

Q Was this an effort undertaken by yourself because of the reclamation work that you've done at Colstrip?

A Yes, it's been kind of a lone study.

MR. PETERSON: That's all I have.

HEARINGS EXAMINER: Mr. Shenker?

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Well, when Mr. Peterson prepared your testimony for you, Mr. Hodder, and sent it to you --

MR. PETERSON: Objection. Well, go ahead and then I'll object.

MR. SHENKER: Yes, sir; whatever you say, Jack.

Q Did you tell him about the fact that the statement on page 7 was irrelevant?

MR. PETERSON: Mr. Davis, I might object then to the form of the question on the ground that it's contrary to the witnesses own testimony.

HEARINGS EXAMINER: I don't quite see the significance of the question as to relevancy as far as this witness. What do you mean on that?

MR. SHENKER: Well, Mr. Peterson went into the fact that there was a process by which the witness gave Jack some --

HEARINGS EXAMINER: Well, he made corrections on it. Okay, you can ask him if he corrected it for relevancy or heresay or anything you want I guess. Go ahead.

Q Yes. You were supposed to make corrections or tell Mr. Peterson there was something in there you didn't want to say, I suppose. Was that the process?

A No, the process was that I got a copy of what was recorded and it was given to me to see if what I had said and the way that I said it was correct, I believe.

Q Well, when you looked at this statement that you say has been recorded, and you looked at the material that's on page 8, the last page of your statement, at line 7 and 8, what was your reaction?

A I had no specific reaction. I think that any of the areas around Colstrip, no matter whether it's A, B, C, or D, I think that we can do a real commendable reclamation job there.

Q That's certainly what you want to do, isn't it?

A Certainly.

Q Sure. Well, let me ask you the question in this form then, Mr. Hodder. When you prepared the answers to the questions that you were asked, which was the basis on which this statement was eventually submitted to you, sir, was one of the answers that you gave in any way referring to the fuels that will be used at the Colstrip units 3 and 4?

A Well, let me answer the first part of that. I was not supplied with questions to prepare answers for.

Q You were asked questions and you made answers?

A Yes.

Q Okay. When you made your answers, did any of those answers refer to the fuels to be used for Colstrip 3 and 4?

A I don't recall that they were.

MR. SHENKER: Thank you, sir. Nothing further.

MR. PETERSON: I have nothing further, Mr. Davis.

HEARINGS EXAMINER: Nothing further? You may be excused.

(WITNESS EXCUSED)

HEARINGS EXAMINER: Next witness?

MR. PETERSON: Would you rule on the exhibits?

HEARINGS EXAMINER: Exhibits 78-A, 78-B, 78-C, and 78-D are admitted. I'm not certain that yesterday I ruled on the last ones you entered, and Applicants Exhibits 77-A through 77-D were admitted that Mr. Dunkle put in and Exhibits 23, 24, 25, and 26 that Mr. Mogen put in were admitted if we didn't admit them yesterday. Have you had an adequate amount of time to look at the report, Mr. Shenker.

MR. SHENKER: I haven't looked at it at all; I've been reading Mr. Mahoney's statement.

HEARINGS EXAMINER: Let's stand and recess a couple of minutes and see where we are.

(Brief Recess)

CHARLES H. MAHONEY, appearing as a public witness, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

HEARINGS EXAMINER: Mr. Mahoney, you filed a written statement, and we will put your name on top of it, Charles H. Mahoney. Your statement will be received in record, and rather than having you read it again and duplicating the transcribing of it again, we'll just receive it as it is and you will submit to cross-examination by Mr.

Shenker. You may proceed, Mr. Shenker.

MR. SHENKER: Thank you, Mr. Davis.

(THE WRITTEN DIRECT TESTIMONY OF MR. CHARLES H. MAHONEY WAS DIRECTED TO BE INSERTED AT THIS POINT.)

Charles H. Mahoney

Mr. Examiner:

Montana should start now to reverse the system we have used in the past. That is that we ship out of state all our copper, gold, silver, lead, meat and grains; then ship back in hams, bacon, beef, mutton, flour, and the rest of the manufactured products we use.

We should never get into the position of having to import electricity after it has been generated some place else like we are doing with natural gas in about 3/4 of our natural gas consumption.

We have the coal and water that will supply this state for hundreds of years all we have to do is see that the power suppliers build the necessary plants, transmission and distribution systems so that all parts of the state can benefit.

We can have and must have reasonable electric rates, not like the gas we are importing from a foreign nation at rates set by the Premier of that nation.

Montana can be the greatest electrical state in this great union. Electricity can and should be our greatest source of energy. We should cook, heat and cool all our homes electrically.

The price of natural gas, propane and oil which we import most of we cannot control the price. With a reasonable price electricity and ample quanties we can attract clear light industries in Montana. This will help to pay the taxes that we pay for all the services that are demanded by the citizens of the State.

Last week the Chairman of the Unemployment Compensation commission stated that the State of Montana must start borrowing from the United States Government to pay our unemployment benefit payments to our unemployed workers. Starting in March. He also said it will take six and one half million dollars to carry us thru June 30, 1976.

May be Montana is not in as good a financial position as we are told.

The property taxes on plants 3 and 4 the first year after completion will amount to about $5,900,000.00

The taxes on the transmission lines from Coal Strip to Hot Springs, Montana will amount to about $4,480,000.00

The total for the 1st year after completion $10,380,000.00

This is all new property taxes.

Now in addition,

The Corporation License tax will be about $ 350,000.00

The electric energy tax will be about $ 400,000.00

Total license taxes at the present rate-- $ 750,000.00

This makes a total of $11,130,000.00 of new taxes in this state we will receive in constructing plants 3 and 4.

We will also have to take into account the 3% of the payroll which will then go to the unemployment compensation fund. And what Income taxes that will be paid by the additional employees at Coal Strip and maintainence men on the 436 miles of 500,000 volt transmission lines.

The construction costs of the transmission lines from Coal Strip to Hot Springs with substations at Broadview and

Helena is estimated at $214,000,000.00. The total assessed value of the Burlington Northern R.R. in Montana for the year 1974 was $89,332,598.00. When we combine the values on the transmission lines versus the entire Burlington Northern System we have $110,409,402.00 in additional tax base to transport the electricity by transmission lines.

While we are discussing taxes I would like to present some other aspects.

I think and it seems to be a pattern of nature that each acre of land should produce what ever its capabilities are, be it fruits, grain, timber, oil, minerals or coal. Bananas don't grow very well in the Artic, but Musk Ox and Polar bears do.

At Coal Strip we have coal and lots of it and it should be mined and used to generate electricity at Coal Strip. I can't think of a better place. Generating electricity with coal at the mine mouth is the cheapest way at the present time in the U.S.A.

In the Report of the Department of Revenue for the period of July 1, 1972 to June 1, 1974 (Pages 108 and 109) the average assessed value of grazing land in Rosebud County was $2.38 in 1973 and $2.37 in 1974. The taxable value of this land was 71 cents per acre in 1973 and 1974. The average taxes per acre was .09 cents in 1973 and .08 cents per acre in 1974.

The total mill levy for school district 19 in Rosebud county (this is the district in which Coal Strip is located) was 134.64 mills in 1973; 129.31 mills in 1974 and 98.18

mills in 1975. This is a drop in mill levy of 34.46 mills in three years about 25% this is not bad when most of the rest of the state has had an increase in levy plus an increased valuation for a lot of property.

Now when one considers the .08 cents per acre taxes paid on the land around Coal Strip that produces grass for livestock may be we should look at the coal tax and what uses would be made of these taxes.

The Rosebud seam of coal, that western energy is now mining produces about 44,000 per acre and if we take that times $1.25 per ton, which is about the coal tax we have $55,000.00 per acre revenue.

Now the McKay seam which is below the Rosebud seam of coal which is not now being mined. I think should be mined now, not wait 50 years or so then have to tear up the top soil again.

The McKay seam will produce 15,000 tons per acre. This increases the coal per acre by about one third and when we add the two seams together 44,000 plus 15,000 tons we have 59,000 tons per acre and at the $1.25 per ton coal tax we have $73,500.00 per acre.

We must also remember the coal mining companies reclaim the stripped land to its former grazing capacities under our present constitution and state laws.

Now I would like to present an idea, I have that might help the State of Montana in the future.

If we take the $73,750.00 coal taxes per acre of land mined and subtract 15% of this for tax revenue to be credited to the common school equalization fund. This would amount to about $11,750. per acre. Thus we have a balance of about $62,000.00 for each acre mined. This money should go to Indemnity trust fund. (Article IX, Section 2, Montana Constitution).

The legislature should enact legislation that 50 percent of the indemnity fund shall be loaned at 1% interest to the Soil and Water Conservation districts of the State of Montana. This money to be used by the districts to reclaim agricultural land. Also to make water available for sprinkler irregation. The land owner then will reimburse the districts who will then repay the trust indemnity fund.

We should be able to reclaim about 10 acres per acre of coal mined. Also we then claim more of the water in the rivers of this state for beneficial uses. This will increase the tax base of the local area. We will then be doing reclamation in the State of Montana by the State of Montana, and not by the federal government with all its regulations.

The balance of the indemnity trust fund should be loaned to Water and Sewer districts that they can develop adequate water and sewer systems on an area basis. This way the cities and all surrounding subdivisions can jointly solve their sewer and water problems. The interest on these loans should not exceed 1% interest.

The one percent interest should pay all the administration costs. The Soil and Water Conservation districts and the Water and Sewer districts should pay their own expenses. I realize that they will not produce as much interest money as would be received if we loaned it to the big banking interests of the United States. It will sure help the districts in saving from four to six percent interest in the loans. We will now use our own money in reclaiming land and cleaning up the environment, plus keeping the indemnity trust fund intact.

When a person looks at the $73,750.00 per acre revenue and what we can accomplish with the money if it is properly handled. The .08 cents per acre we are now receiving for taxes seems like a small price to pay when the mining companies have to reclaim the land and we continue to receive the .08 per acre after reclaimation.

It seems like we are having a problem with air pollution in plants 3 and 4. Does the Department of Natural Resources have any idea of what kind or type of equipment that is necessary to be installed in plants 3 and 4 that they might comply with Montana Standards? If they know of any kind of equipment have they asked the companies to install that equipment that will make the plants operate within our standards?

In Wyoming the Missouri Basin Power Project and the Department of Environmental Quality reached an agreement in December, 1975;

> "SO_2 Pact Reached For MBPP Plant.
>
> "The participants in the Missouri Basin Power Project (MBPP) and the Wyoming Department of Environmental quality last month reached agreement on sulfur dioxide (SO2) pollution control equipment to be in-

> stalled on the 1500 megawatt coal-fied Laramine River Power Station to be built near Wheatland.
>
> In the agreement the project sponsors agreed to installation of SO2 controls to meet Wyomings's Sulfur dioxide emission laws passed in the last legislative session. The Wyoming lawmakers passed a .2 lbs/million BTU emission standard, the toughest in the United States and six times more stringent than those required by the National Environmental Protection Agency (EPA) and the National Environmental Policy Act of 1969.
>
> The accord reached by the Wyoming DEQ and MBPP sponsors includes a provision stating that in the event the pollution control equipment fails to meet the state's standards, the DEQ will support a variance application submitted by the project.
>
> Manager of MBPP Wyoming Operations LLoyd Ernst said the MBPP participants are pleased with the agreement and called it an important step forward. He said that any further delays in getting the Laramie River Power Station into construction could cost rural consumers and businesses a great deal of money and more seriously, the availability of an adequate supply of power in the 1980's." Basin Electric Report, Jan., 1976. (Emphasis supplied).

When we start to think of the needs and the amount of electricity that will be necessary in 1980 to 1985 we see the problems that have developed in the last few days in regard to atomic power plants.

Scientists resigning from General Electric Company and from the Atomic Energy Commission.

The Congress passing and the President signing the bill that locked up the greatest hydro project left in the Continential United States. Hills Canyon between Oregon and

Idaho.

Canada placing quotas and higher prices on natural gas and oil.

Just when and where are we going to get the necessary energy that is needed in the United States for Home, Industry and agriculture.

Ample electricity at a reasonable cost is the only answer.

At a meeting in Denver, Colorado on December 9-11, 1975 the Preference Customers Conference of the Midwest Electric Consumers Association, Mr. William Eisele made the following comments:

> "Speaking for the Lincoln (Nebraska) Electric System, William Eisele said that municiplaities face the same problems of increased electric demands, that other consumer-owned systems do.
>
> 'In 1967 the Lincoln Electric System was serving 50,968 customers and at the end of the last fiscal year we were serving 67,818 customers, or an increase since 1967 of just over 2,100 new customers per year. Over the past three years, despite the state of our national economy, the increase has been more than 3,000 customers per year,' he said.
>
> We have had dozens of students and other self-appointed experts advise us in Lincoln that stronger conservation efforts will eliminate the need for additional power plants. That industry just uses too much power, and if we just wait for solar development, our energy needs will be met and people will be served. It is hard to reject the positive intent . . . but as a practical matter we must meet near future power needs with present technology and by near future I'm talking about the next decade that must be addressed now,' he said.
>
> We need substantially increased electric generating capacity, fired by coal and nuclear fuel. We must,

> as a nation, eliminate the procedural delays and the state to state barriers being erected to the proper development of our natural resources. We must stop harassment law suits and cut the red tape that at present is preventing us from meeting future electric needs.'" Basin Electric Report, Jan., 1976.

In summary, I would like to suggest to the Board of Natural Resources to follow the pattern that Wyoming has taken on their standards (and the toughest in the United States) we can follow their path easily with our lower standards.

Montana needs the jobs now that will be created by the construction of Plants 3 and 4 and the transmission lines to Hot Springs. This will help the Workmen's Compensation fund plus reduce the unemployment rate in Montana. Plant 2 is laying off employees all the time now, and expected to lay off all construction employees by October 1, 1976 when plant 2 goes on the line.

Montana and the United States will need the electricity that is to be produced by 3 and by 1980. This is still one country and the states must help one another.

EXAMINATION OF CHARLES H. MAHONEY

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Mr. Mahoney, were you aware of the fact, sir, before you came in here today and had a chance to listen while I had some conversation with a couple of the earlier witnesses, that Montana is a net exporter of energy?

A I think you are right. What are you exporting it from? Might I ask you a question?

Q No, I'm afraid we can't do that, Mr. Mahoney, although I am going to make an exception for you, you'll see later on in your statement.

A All right, all right.

Q You refer to some property tax data in your statement. Did you get that from property tax records or did you get it from some other source?

A What are you talking about, which page?

Q Page 2, paragraph 3.

A Page 2 and paragraph 3, the property tax on plant number 3 and 4?

Q Yes.

A Is that the one?

Q Yes.

A Okay. I called Montana Power and asked them to give me the amount of taxes from it, and I want it understood I asked them for it.

Q Good.

A And I got it.

Q This was a telephone call that you made?

A I made a telephone call to Montana Power and asked them if they could get me the following things, and I wanted one, the cost of plants, the cost of taxes, and everything about it. This is what I asked.

Q Good. Did you use the same process for asking Burlington Northern what their property taxes were?

A No, I took that out of the Department of Revenue's biannual report. That is on here, and if you wish I could even give you the page.

Q Oh, the date will be fine.

A This is out of the period from July 1, 1972, to June 30, 1974.

Q Thank you very much, sir. Now on the third page of your statement, Mr. Mahoney, the third new paragraph, you tell me that generating electricity with coal at the mine-mouth is the cheapest way at the present time in the U. S. A.?

A That's right.

Q Have you talked to anybody from the Portland General Electric Company about that?

A No, no, I don't have to talk to them. This is a fact; it's been known for years.

Q Did you communicate that fact to the folks who are participating in nuclear regulatory commissions on behalf of the applicants to this proceeding?

A No.

Q You also advocate the use of the McKay seam of coal in the Colstrip area?

A Yes, I do.

Q Yes, good. Where did you want to use the McKay coal in particular, or did you not have any particular preference?

A All I want it mined at the same time they take out the other two strips, and they can export it, they can ship it out, they can do anything they want; but I want it mined at the same time as the other, not go back 50 years from now and re-mine it. That's all I want.

Q You don't care what the use is so long as it's mined?

A No, that's right; mined at this, mined there.

Q Good. I'm very much interested and grateful to you, Mr. Mahoney, for introducing into the record page 7 of your statement, the decision made by the folks in Wyoming that a coal-fired generating station there would achieve a pollution control that would result in .2 of one pound per million BTU emissions. And then again on page 9 of your statement, you suggest that Montana should follow the pattern that Wyoming has in those standards; is that right?

A That's right.

Q I appreciate that, sir.

MR. SHENKER: I have no further questions, and I appreciate your being here.

HEARINGS EXAMINER: Thank you, Mr. Mahoney. You may be excused and thank you for your appearance.

(WITNESS EXCUSED)

HEARINGS EXAMINER: Now if you would prefer, Mr. Shenker, we can recess until after lunch and you have a chance to study that report, or we can do it now, whichever is your preference. We do have some other witnesses at 1:30 so we will have to come back at 1:30 anyway.

MR. SHENKER: I have no particular preference.

HEARINGS EXAMINER: Well, I mean you're going to have to take 15 minutes or so, aren't you? It's a lengthy report.

MR. SHENKER: Yes, and I think I probably better read it carefully, Carl. It looks like there's some good stuff in here and it's 65 pages.

HEARINGS EXAMINER: Let's recess until 1:30. There's no use us all sitting here and watching you read.

(RECESS AT 11:35 A.M.)

Following the luncheon recess, the hearing reconvened at 1:37 P.M. on February 12, 1976.

HEARINGS EXAMINER: We have several public witnesses here, and we'll defer, Mr. Labrie, if that's all right with you and counsel, finishing up you until we take the public witnesses. I think I've explained to the various ones, but if I missed anybody, the procedure, if you do have a written statement, would be that you are simply sworn and your statement will be received in evidence and made a part of the transcript that goes to the Board, who are the decision-makers in this matter. You will then be subject to cross-examination by counsel for the opposing party. If you're a proponent, then the opponents would cross-examine you; if any of you are opponents, then the proponents have the right to cross-examine; but we do not have redirect and re-cross. We do have to give the opponents' counsel time to read the statement so they can ask any questions necessary, but I think you are prepared on one or two of these, aren't you, Mr. Shenker?

MR. SHENKER: Mr. Sept and Mr. Wetstein had delivered their statements earlier so I am prepared on these.

HEARINGS EXAMINER: All right, we'll start with Mr. Wetstein then.

WILLIS J. WETSTEIN, appearing as a public witness, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

(THE WRITTEN DIRECT TESTIMONY OF MR. WILLIS J. WETSTEIN WAS DIRECTED TO BE INSERTED AT THIS POINT.)

January 15, 1976

STATEMENT OF WILLIS J. WETSTEIN
Chief Environmental Engineer
Morrison-Maierle, Inc.
Consulting Engineers
910 Helena Avenue
Helena, Montana 59601

BACKGROUND:

EDUCATION - Montana State University, B.S. Civil Engineering, 1957

SPECIALIZATION - Water Supply and Treatment Systems
Sanitary Sewer Collection and Treatment Systems
Storm Drain Systems
Industrial Systems

EXPERIENCE - 1957-58, Morrison-Maierle, Inc. - Civil Engineer
1958-60, " " - Project Engineer
1960-65, " " - Sanitary Design Engineer
1965-Present, " " - Chief Environmental Engineer

REGISTRATION - Registered Professional Engineer

Montana - 883E
Arizona - 5611
New Mexico - 9833

STATEMENT:

My testimony is related to energy requirements for wastewater treatment plants. I have personally been involved in the design and construction of many such plants during the past 19 years. The firm of Morrison-Maierle, Inc. has been engaged in wastewater treatment plant design as well as other types of Civil Engineering projects for the past 30 years.

The changes in water quality standards and public attitude that have taken place in recent years have resulted in growing sophistication of wastewater treatment processes and facilities design. Regulations and goals set forth by the Environmental Protection Agency require that municipal wastewater treatment plants be upgraded to secondary standards by 1977. Many cities in Montana have already constructed new secndary plants; others will be constructing them soon.

The increased effort to protect our water resources has significantly increased the demand on our electrical energy resources. Modern secondary and tertiary wastewater treatment facilities require from 4 to 15 times more electrical power than the primary plants of the past.

A report entitled, "Electrical Power Consumption for Municipal Wastewater Treatment", EPA-R2-73-281, July 1973, indicates that power requirements average about 0.38 kwh per 1000 gallons of treated wastewater for a 1.0 Million Gallon per Day (MGD) plant to 0.22 kwh per 1000 gallons for a 10 MGD plant to provide primary treatment. These averages increase to 1.20 kwh per 1000 galons and 0.88 kwh per 1000 gallons for 1.0 MGD and 10.0 MGD plants respectively for secondary treatment.

The Cities of Helena and Kalispell have recently completed construction of facilities necessary to upgrade their plants from the primary to secondary process. Both of these plants were designed by our firm. Attached is a listing of electric motors at each plant comparing horsepower requirements for the previous primary system and the new secondary system. Note that the total horsepower at the Helena plant has increased by about 7 times from primary to secondary, while the Kalispell plant increased by more than 13 times. The larger increase at the Kalispell plant reflects additional filtration equipment installed at this plant which provides treatment of a higher standard than secondary. It must be recognized, however, that all motors at the plant do not run continuously and the listed horsepower ratios do not necessarily reflect the consumptive power requirements under each process. A check with these communities reveals the following consumptive averages for the primary and secondary processes:

KALISPELL WASTEWATER TREATMENT FACILITIES
MAJOR EQUIPMENT HORSEPOWER SUMMARY

PRIMARY TREATMENT PLANT

	ITEM	RATING (HP)
1.	Comminutor	1
2.	Grit Separator	½
3.	Grit Separator Conveyor	½
4.	Primary Clarifier #1	3
5.	Primary Clarifier #2	3
6.	Digester Recirculation Pump	1
7.	Sludge Pump	3
8.	Sludge Recirculation Pump	3
9.	Digester Mixer	10
	TOTAL	25

SECONDARY TREATMENT PLANT AND FILTRATION PLANT

	ITEM	RATING (HP)
1.	Comminutor	1
2.	Grit Separator	½
3.	Grit Separator Conveyor	½
4.	Primary Clarifier #1	3
5.	Primary Clarifier #2	3
6.	Filter Backwash Pump #10	50
7.	Filter Influent Pump #6	15
8.	Filter Influent Pump #7	15
9.	Filter Influent Pump #8	40
10.	Backwash Waste Return Pump #9	3
11.	Filter Surface Wash Pump #11	10
12.	Recirculation Pump #3	50
13.	Recirculation Pump #4	30
14.	Recirculation Pump #5	20
15.	Oxidizer Recirculation Pump	20
16.	Oxidizer Pressure Pump	2
17.	Sludge Disintegrator	2
18.	Secondary Clarifier	½
19.	Electric Hoists (Total)	10½
20.	Compressor	3/4
21.	Oxidizer Influent Pump	5
22.	Sump Pump	½
23.	Sludge Waste Pump	3
24.	Sludge Recirculation Pump	3
25.	Raw Sludge Pump #1	5
26.	Sludge Transfer Pump	1
27.	Future Filter Influent Pump	40
	TOTAL	334¼

HELENA WASTEWATER TREATMENT FACILITIES
MAJOR EQUIPMENT HORSEPOWER SUMMARY

PRIMARY TREATMENT PLANT

	ITEM	RATING (HP)
1.	Comminutor	5
2.	Grit Separator	5
3.	Grit Separator Conveyor	3/4
4.	Primary Clarifier	3/4
5.	Digester Mixers, 2 @ 10	20
6.	Sludge Recirculation Pumps, 2 @ 2 =	4
	Well Pump	10
8.	Primary Sludge Pump	5
	TOTAL	50½ HP

SECONDARY TREATMENT PLANT

	ITEM	RATING (HP)
1.	Comminutor #1 (Rotagrator)	5
2.	Comminutor #2 (Worthington)	1½
3.	Grit Separator #1	1
4.	Grit Separator #1 Pump	15
5.	Grit Separator #2	5
6.	Grit Separator #2 Conveyor	3/4
7.	Primary Clarifier	3/4
8.	Secondary Recirculation Pump No. 1	75
9.	" " " " 2	40
10.	" " " " 3	50
11.	" " " " 4	75
12.	Sludge Waste Pump No. 5	2
13.	" " " " 6	2
14.	Sump Pump (Second. Recirc. Bldg.)	2
15.	Hoist (Second. Recirc. Bldg.)	2¼ (Total)
16.	Secondary Clarifier No. 1	3/4
17.	" " " 2	3/4
18.	Hoist (Sludge Ox Bldg.)	3 (Total)
19.	Oxidizer Pressure Control Pump	7½
20.	Oxidizer Recirculation Pump	30
21.	Sump Pump (Sludge Ox. Bldg.)	½
22.	Maz-O-Rator	10
23.	Primary Sludge Pump No. 7	7½
24.	Oxidizer " " " 9	7½
25.	Sludge Recirculation Pump No. 8	2
	TOTAL	346 3/4

	Helena	Kalispell
Plant Capacity	6.0 MGD	2.7 MGD
Present Average Daily Flows	3.5 MGD	2.0 MGD
Aver. Power Consumption--Primary Plant, kwh/day	164	248
" " " --Primary Plant, kwh per 1000 gals.	0.047	0.124
" " " --Second. Plant, kwh/day	2177	1150
" " " --Second. Plant, kwh per 1000 gals.	0.622	0.575

Note that the energy requirements for the Kalispell plant have increased by almost 5 times whereas the Helena plant increased by more than 13 times. On the basis of volume of wastewater treated, the power consumption for secondary treatment amounts to about 0.575 kwh per 1000 gallons at Kalispell and 0.622 kwh per 1000 gallons at Helena. Most Montana communities, being smaller than Kalispell and Helena, will consume more kwh per 1000 gallons of wastewater since smaller plants are not as efficient as larger installations.

In summary, it can be seen that electrical energy plays a very important role in the future of wastewater treatment and preservation of our State's water quality. This presentation is an attempt to set forth the magnitude of the increased electrical requirements for the new treatment process required to meet new water quality goals.

Willis J. Wetstein
Willis J. Wetstein, P.E.
Chief Environmental Engineer
Morrison-Maierle, Inc.

HEARINGS EXAMINER: You may cross-examine, Mr. Shenker.

EXAMINATION OF WILLIS J. WETSTEIN

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Mr. Wetstein, are you an officer with Morrison-Maierle?

A Yes, I am.

Q What is your title, sir?

A I'm chief environmental engineer at Morrison-Maierle.

Q That's your position; do you have a corporate office there?

A Oh, excuse me; no, I do not.

Q Are you testifying in your own individual capacity or on behalf of the firm today?

A On my own capacity.

Q Have you been involved, Mr. Wetstein, on behalf of Morrison-Maierle with the contract that your firm has with the Fort Peck Indians on water development?

A Yes, although I'm not real familiar with that; it's in a different department of the organization.

Q What is your understanding of the role that you have in connection with that water development?

A In our company we have a water resources department headed up by Mike Watson who does work under my department, the Environmental and Water Resources Department. He, in that capacity, has charge of that project which is being conducted for the Bureau of Indian Affairs.

Q What is Morrison-Maierle doing for that is the question, sir?

A On the Fort Peck project?

Q Yes.

A Among other things we are conducting a water resources study to determine quantities and quality of water, determining needs for water from the reservation, future water needs as well as present water needs.

Q In that task, are you in an adverse relationship to that of the Department of Natural Resources and Conservation?

A I'm not sure.

Q Now you state in the conclusion of the prepared testimony that is in the record now from you, Mr. Wetstein, that your presentation has been an attempt to set forth the magnitude of the increased electrical requirements for new treatment process required to meet new water quality goals. Can you tell me, sir, in terms of megawatts what you believe the increased electrical requirements would be?

A For the whole state of Montana?

Q Yes, sir.

A That isn't part of my statement, but I do have some calculations that I have prepared. In the state of Montana, of course not all people are on a municipal type waste water system; a rough estimate might be about 500,000 people in the state would be on a municipal type system. Using a factor that we are projecting for electrical needs for secondary treatment processes which are the goal of the Environmental Protection Agency by 1977, we would estimate as a minimum for these 500,000 people approximately a usage of about 50,000 kilowatt hours per day. That is my own estimate which I have projected from the needs of plants that I have personally been involved.

Q You say kilowatt hours?

A Yes.

Q Can you tell me how many kilowatts of power that would be?

A I haven't got a total on that; I have a few of the major cities which I have summarized. The largest plant in Montana at Billings by the end of 1976 when they complete their present construction program they propose to have a 6,200 kilowatt connected load at Billings. Kalispell has 250, Helena 259.

Q These are kilowatts, sir?

A Yes, these are kilowatts. Great Falls, Missoula, Bozeman and Havre I do not have their present or their projected totals, although I have increases for Great Falls in this next program; at their waste water plant, they're planning to add a load of 1,380 kilowatts. Missoula is planning to add 955, Bozeman 522, Havre 355. Now those are only the major cities, and I didn't put any kind of a total on those. Of course, the smaller cities these vary quite a bit, depending on the size of the community.

Q Could I take a look at those figures, Mr. Wetstein?

A Yes.

(Pause to review.)

Q Okay, Mr. Wetstein. I've just had a chance to look over those figures with you quickly, and as I quickly scanned them and added them with you, it looked like something under 6,000 kilowatts for all those major cities; is that right?

A Yes, that would be for those that I named, yes.

Q Now 6,000 kilowatts, of course, we know for the record is about 6 megawatts, and you don't have the figures of all of the present consumption; is that right?

A No, I don't.

Q Would you agree with the statement, Mr. Wetstein, that sewage treatment is not an energy intensive process?

A It didn't used to be, but it seems like anymore it is.

Q Are you familiar with the study done by the Cornell Agricultural Waste Management Conference in 1975 in which they addressed whether sewage treatment was or was not an energy intensive process?

A No, I'm not familiar with that report.

Q Are they a pretty savy group?

A I'm not familiar with them.

Q Okay. Now I take it from your standpoint, Mr. Wetstein, what you're interested in is to make sure that there is some energy around to service the wastewater treatment facilities that you're engaged in proposing, developing and studying?

A That's true.

Q And does it matter to you whether that energy comes from a load center or from some other place?

A As far as the plant operation and design, no.

MR. SHENKER: I have no further questions, and I thank you very much, Mr. Wetstein.

MR. PETERSON: Mr. Davis, I realize what the ruling has been by the Hearings Examiner, but I think in the matter of the examination of this witness relative to the figures which he gave and totals which are apparent, and the manner in which the question was asked that for the purpose of clarification we should be entitled to ask this witness relative to the total number of megawatts that the 6 megawatts apply to what cities.

MR. SHENKER: He named the cities; do we have to name them again?

MR. PETERSON: But it doesn't add up.

MR. SHENKER: That's right; it's less than 6 megawatts, it's 5,400 kilowatts; that's 5.4 megawatts, but we can name the cities again. I don't think that's necessary.

HEARINGS EXAMINER: Were you referring, sir, to the cities that you did name on that?

WITNESS: Pardon?

HEARINGS EXAMINER: Were you referring to the total figure of 6 or 5.4 megawatts to the six cities you named, Billings, Kalispell, --

WITNESS: Yes, there was seven cities, Kalispell, Helena, Billings, Great Falls, Missoula, Bozeman and Havre which I named.

HEARINGS EXAMINER: And those are the only ones you are referring to in that total of -- that you added up that was referred to roughly as 6 megawatts?

WITNESS: Yes.

MR. BELLINGHAM: I think the question has arisen as a result of some previous testimony by the witness to the effect that Billings alone had 60,000 kilowatts as I recall.

MR. SHENKER: No, that's confusing. Mr. Wetstein said that Billings proposes to have a total plant capacity of 6,200 kilowatts, but it now has 2,700 kilowatts and proposes to add 1,800 kilowatts. So the Billings figure is 1,800 kilowatts to bring it up to 4,500 kilowatts.

HEARINGS EXAMINER: Is that correct, sir?

WITNESS: That isn't quite correct.

HEARINGS EXAMINER: All right; you can go ahead and explain then.

WITNESS: Billings had a demand in the fall of 1975 of 2,700 and they will be increasing that to 6,200 at the end of their proposed program; they have a date of 1976 on that now. So that would be an increase of 3,500. I think I misled you on that.

MR. SHENKER: I see, okay. The figure is 3,500 not 1,800 for Billings?

WITNESS: That's correct.

MR. SHENKER: Okay. With that correction the statistics would be the same otherwise.

MR. BELLINGHAM: Does that change the total at all?

WITNESS: I was just trying to total those up quickly.

MR. SHENKER: That would be a change of 1.7 megawatts.

WITNESS: I come up with for those cities an increase of about 7.3 megawatts.

MR. SHENKER: I was fairly accurate then.

HEARINGS EXAMINER: For the seven. Does that clarify the point that you were referring to, Mr. Peterson?

WITNESS: This is the increased load from what they had originally and under their present construction programs to update those facilities to new standards.

MR. SHENKER: And you don't have all the figures for what the present consumption is?

WITNESS: No, I don't. I don't have all of what their present loads are.

HEARINGS EXAMINER: Anything further anyone? (No response.) Very well, you're excused and thank you, sir.

(WITNESS EXCUSED)

HEARINGS EXAMINER: Are we ready for Mr. Porter?

MR. SHENKER: No, Mr. Sept, I think.

HEARINGS EXAMINER: Is Mr. Sept here?

AL SEPT, appearing as a public witness, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

(THE WRITTEN DIRECT TESTIMONY OF MR. AL SEPT WAS DIRECTED TO BE INSERTED AT THIS POINT.)

STATEMENT IN FAVOR OF COLSTRIP 3 AND 4 PROJECT

by

Flathead Irrigation Project Power System

My name is Al Sept. I am now and have been the Power Superintendent for the Flathead Irrigation Project Power System for about the past 20 years. The Flathead Irrigation Project Power System is the 4th largest electric utility operating in the State of Montana, and currently serves about 10,000 customers located generally on the Flathead Indian Reservation. In calendar year 1975, our customers consumed 170 million kilowatt-hours and demanded a peaking capacity of 34.7 megawatts.

As most small utilities, we depend upon other generating facilities to supply our loads. Currently we receive about 57% of our energy requirements and 32.3% of our peaking requirements from the Montana Power Company under a Federal Power Commission allocation of a portion of the Kerr Dam generation. 41.7% of our energy requirements and 66.7% of our peaking requirements are supplied by Bonneville Power Administration from the Federal system. The remaining 1% is generated at our own small hydro-generating plant on the East Shore.

Our growth rate trends are similar to other utilities located in the northwest region. For the past 20-year period, our average annual growth rate has been 7.2%. The growth rate for the past 10 years has been about 1/2% greater than the 1953-63 period.

It is our opinion that our growth rate will continue to increase at an even faster rate during the next 10 years. This trend will be stimulated by the pressures of the decreasing availability and the increased cost of fossil fuels, particularly fuel oil and propane. The electric supply for the northwest region has basically been from hydro facilities which have produced relatively low cost energy. Practically all the economical hydro generation sites have now been developed and the utilities of this region must now look to thermal generation for their future needs. Thermal generation is substantially more costly than hydro generation. However, because of the diluting effect of the low cost hydro power, it will take a number of years until electric energy costs in this area will escalate at the same rate that fuel oil and propane have. This simply means that many of our existing and future customers will be looking to electric heating as a more economical method of heating their homes and businesses.

As an example, over 80% of the new homes and apartments constructed in our service area this past year will be heated electrically. Prior to the oil crisis in 1973, less than 25% of the newly constructed homes included plans for electric heating systems. Likewise, a surprising number of commercial and non-residential structures are now installing all-electric heating systems and require substantial capacity allocations to serve them. For example, we are now serving an all-electric high school which requires in excess of 1,000 kw of capacity, and a new County courthouse which is just being completed. It will require over 500 kw of capacity. By comparison, these two loads will require more capacity than we have allocated to some of our rural substations, each of which serve over 500 residences, farms, and small businesses.

Further, there is a tremendous interest in conversion of oil and propane fired heating systems to some type of electric systems, even though it is still more economical to heat with fuel oil. They justify these conversions because of the availability of electricity. It is a simple matter to ration one's fuel oil supply, but most people agree it would be difficult to ration their electric heating supply. I should add that we do not spend one cent promoting electric heating sales. As a matter of fact, we have a balloon type residential rate which should normally discourage excessive consumption.

Every utility system in the Pacific Northwest is concerned about its future supply of electric energy. It is a known fact that one large thermal plant is more economical to construct and operate than several smaller plants; and for this reason, the utilities throughout the Pacific Northwest have joined together in groups to develop an adequate supply of electric energy for the region. The 104 publicly owned utilities of the region are currently firming up plans for the construction of several large thermal plants to be located in Washington and Oregon. Some of the electric energy generated at these plants will be allocated to Montana based public utilities. Likewise, the private section is also struggling to meet the future demands of their customers by pooling their efforts and resources to construct additional generating facilities. To my knowledge, the Colstrip development is the only thermal-generating project now under active consideration for location in Montana. We believe a Montana based facility is necessary to maintain a balance in the grid system for the Pacific Northwest region.

For the above reasons, we strongly support the Colstrip 3 and 4 Project.

EXAMINATION OF AL SEPT

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Mr. Sept, you've been the power superintendent for the Flathead Irrigation Project Power System for quite some time now, some twenty years?

A Yes, I have.

Q And you tell us in your statement prepared for this hearing, sir, that your peak capacity was 34.7 megawatts last year?

A That's right.

Q What was the average energy?

A Well, we used a total of 170,000,000, and we fluctuated from about 12,000,000 per month to 16,000,000 per month.

Q That will confuse us a little bit for the board. They are accustomed to hearing from the witnesses in this proceeding an average energy figure in kilowatts as opposed to kilowatt hours. Can you give me a kilowatt figure for average energy as opposed to peaking; not kilowatt hours but kilowatts?

A No, our system normally runs about 65 percent load factor. In the summer time it runs almost 100 percent load factor.

Q All right, so annually it would be about 70 percent of 34.7?

A I would say so, about there.

Q So we're talking about something in the neighborhood of 22 or 23 average energy megawatts?

A Probably.

Q Who supplies power to the Flathead Irrigation Project Power System now?

A Well, my statement indicates that we get power from the

Montana Power Company under our grant to license five of the Kerr Dam development and also from the Bonneville system under another agreement.

Q As I understood it from your statement, there are three sources; one you have your own small hydro generating plant on the east shore.

A We have a small 400 kilowatt plant that was there in 1950 and we're still operating that plant.

Q Has your company given any consideration to additional generating facilities of their own or in concert with others?

A We have been, but because we are a federal entity, a part of the Bureau of Indian Affairs--we have been trying to group with the other public systems in the northwest, but because of the fact that we are a federal entity, as of this date we have not been able to join with the other 104 public utilities in the northwest. Hopefully we will be able to do that within the next few months.

Q You're working on that as one way to provide a sounder resource base for yourselves?

A Yes, we are.

Q Good. Page 3 of your statement, Mr. Sept, if you would look at that with me, please, sir. As I understand it, you see a substantial or tremendous as you call it interest in conversion of oil and propane fired heating systems to some type of electric systems because of the availability of electricity; is that right?

A Yes, sir.

Q Now you make reference to the publicly owned utilities of the region that are firming up plans for the construction of large thermal plants to be located in Washington and Oregon. By the region, do you mean the Pacific Northwest?

A Yes, I do.

Q Does the Flathead Irrigation Project have any interconnection to the south or to the east?

A I don't quite understand your question. We are connected with the Kerr facility, and the whole northwest is interconnected.

Q And you are, too, of course, therefore?

A Yes, we are, too.

Q All right, and you would also be interconnected to the east and to the south of where you are situated?

A Only if Montana Power Company were connected that way.

Q And you know that it is, don't you?

A Yes, partially.

Q Now are you familiar with the Washington Public Power Supply System sponsorship of the project that they call unit number 5?

A Is that the Hanford project?

Q It's called WPPSS number 5, sometimes referred to as the Hanford project?

A No, I'm acquainted with the WPPSS, some of the WPPSS; we have not been able to participate in that program so I am not too familiar with it.

Q Were you familiar with the WPPSS number 5 project in the sense that WPPSS has withdrawn from it?

A No, I'm not.

Q Now, from your standpoint at the Flathead project, Mr. Sept, you are interested in seeing a Montana based facility available to you, but it would be preferable from your standpoint to have that facility as close to you as possible; isn't that true?

A Not necessarily, not as long as it was delivered to our bus bar; that's our interest. We don't really care where it comes from.

Q From an overall planning standpoint, I take it you would generally be interested in minimizing line losses as much as possible; wouldn't you?

A Well, if it were delivered to our bus bar at Kerr Dam, it wouldn't make any difference.

Q Even if it got lost on the way to your bus bar?

A It would not be our loss because we'd meet it at the Kerr Dam bus bar.

Q Yes, but I was talking a little bit beyond your personal or private perspective of your project. In terms of your overall energy planning, you're interested in minimizing losses; aren't you?

A Well, I think the northwest system as a whole is operated that way now.

Q Sure, and that's one of the criteria on which one should proceed; isn't it? Isn't that one of the criteria?

A Well, yes. The whole system is inter-connected and it's operated differently each day.

Q Yes, but the system is predicated, is it not, on the hope that you will minimize losses?

A I would say so; it would be operated for top efficiency and for the water which is stored in the system.

MR. SHENKER: That's all I have. Thank you very much, Mr. Sept.

HEARINGS EXAMINER: Thank you, Mr. Sept. We excuse you.

(WITNESS EXCUSED)

HEARINGS EXAMINER: Which one do you have in front of you, Mr. Shenker, that you'd like to read?

MR. SHENKER: I have two statements that I haven't read yet that were handed to me just a little bit ago, Mr. Hubert White and Mr. William H. Porter.

HEARINGS EXAMINER: Well, why don't you take a look at those; they are here, and then when you're ready, just let us know.

(BRIEF RECESS)

MR. SHENKER: I have read the statement of Mr. White.

HEARINGS EXAMINER: Okay, we will begin then with Mr. White.

HUBERT G. WHITE, appearing as a public witness, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

(THE WRITTEN DIRECT TESTIMONY OF MR. HUBERT G. WHITE WAS DIRECTED TO BE INSERTED AT THIS POINT.)

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STATEMENT FOR HEARING
ON
COLSTRIP THREE AND FOUR

My name is Hubert G. White of Townsend, Mont. and I am making this statement as a citizen and small industry operator concerned with our National energy shortage and its effect on our economy and our environment.

In an attempt to become informed on this subject, I have attended numerous meetings at which pro and con statements were made by the power people on one side and The Department of Natural Resource people on the other and I have made a trip to Colstrip and toured the area and observed the "spoil banks" and the reclamation that is proceeding on them. The reclamation job being done there is excellent. When one reads newspaper reports of the almost hysterical rhetoric concerning the area and the reports of devastation that is supposedly taking place, one can't help questioning whether we are talking about the same area. It would seem that West Virginia and other eastern states where stripped areas were devastated are being confused with Montana, and the fact that Montana has a strict strip mine law that is working is being ignored.

The Montana legislature passed the toughest strip mine bill in the nation and it is being enforced as it should be. Montana has tough water and air quality laws. They are being enforced as they should be. We should however, differentiate between "enforcement" and "harrassment".

I am in the lumber manufacturing business and we, as do the other mills in Western Montana, depend on the operation of the pulp mill in Missoula. If it doesn't run, then we don't run. On occasion in the past, the pulp mill has been rationed on natural gas and has had to curtail operations which in turn caused unemployment in the lumber mills throughout the Western part of the state because they were unable to deliver their chips to the pulp mill. The lumber mills can't operate without a chip market. This is only one example. All other industries are dependent on energy in some form and any curtailment of this energy will cause industrial down time with the accompanying depression.

If we are to continue to have a viable economy with a high standard of living, we will need an uninterrupted flow of energy to all industry, including agriculture.

It has been said by the opponents of 3 and 4, that the power companies have overestimated the growth of the energy demand. This is an indefensible statement, but assuming that perhaps the power companies have made an error in judgment, that perhaps instead of our power requirements doubling in the next 10 years as they have in the past, it may be 25 years in doubling. Is it bad to over estimate the demand? Suppose the power companies are 5, even 25 years ahead of the demand, is that bad? But suppose the opponents should prevail and we then are 5 - 10 years behind our needs? It shouldn't take much vision to foresee the catastrophe which would be forced upon the people of Montana and the nation if such should be the case.

About 23 years ago some associates and I established our small lumber manufacturing concern in Townsend in Broadwater County. In that 23 years, our original work force has multiplied by 15 times to about 150 employees. Our electric energy requirements have increased by the same proportion, 15 times in the last 23 years. We were able to build this business only with and by the use of electric and petroleum energy.

An even greater use increase of energy has been experienced by the farmers and ranchers in Broadwater County over this same 23 year span. The rural areas have become electrified. This is true not only in Broadwater County but nationwide. Perhaps this energy revolution "down on the farm" has contributed more to the high living standards enjoyed by the American people than any other factor. Because of this agriculture energy use increase in the past 50 years we have seen the efficiency of the farms increase from one farm worker producing enough food for himself and six others to now enough for 60 others. For this reason, less than 20% of our total population now live on farms, versus 80% 50 to 70 years ago.

Under the old system, the other 60% of the people would still be "down on the farm", that wasn't bad and I personally look back on my boyhood on the farm with nostalgic pleasure. However, we can't go back, we must move forward.

Great strides are being made in the improvement of the environment under the laws, in some cases however, the improvement is not being made as rapidly as some would like, in many other cases, faster than industry can afford. There is evidence that the economic depression in which we find ourselves was influenced in part by exessive environmental pressures.

Our economic system is a finely tuned and balanced machine. The continuing environmental violent attacks on it have thrown it out of time, much as a motor with a faulty timing gear.

I firmly believe that if such attacks continue as they are on Colstrip 3 and 4 and other similar attacks throughout the nation, that our national industrial machine may suffer irreparable damage.

Energy is Energy whether it be natural or propane gas, oil or electricity, a shortage in one creates a shortage in the others. An increase in price in one will automatically sooner or later cause price increases in the others.

We note a recent news item calling attention to the inflationary increase of the cost of building Colstrip 3 and 4 by 40 million dollars due to the year of delay caused by the battle to stop Colstrip 3 and 4. I have been in construction all my life, 40 million is an understatement, it will be closer to 60 - 75 million if it suffers no more than a year's delay.

Do I need ask the question "who will pay for this"?, of course we all know, we each and every one will pay for this.

This battle, so called against the power companies, isn't against the power companies at all. In the final analysis it is against each and everyone of us. We the people, the users of energy, will either benefit or suffer, depending on whether Costrip 3 and 4 is built or not built.

I would suggest that the opponents of energy development would better serve society and the future of our nation and the world by expending their efforts in a positive way, by working towards energy development and new energy sources, such as solar wind and tidal. I firmly believe that such a positive approach would gain more for us all, both environmentally and economically.

EXAMINATION OF HUBERT G. WHITE

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Mr. White, have you had any contact with any of the representatives of any of the applicants in this proceeding before coming here today?

A Except to say that I would be here and ask if I would appear. I had taken the initiative, incidentally, on whether I would appear or not.

Q With whom did you have your contact, sir?

A I called Mr. Davis when I heard of the dates that were indicated that I'd seen something about in the paper, and asked his advice on the procedure to follow; and I have since, when I came in here, talked to Mr. Ross of Montana Power and asked him what procedure to follow.

Q In your lumber manufacturing business, Mr. White, you are heavily dependent upon the production from the Hoerner-Waldorf plant; is that correct?

A We're, I would say, entirely dependent upon it. If we can't sell our chips, we can't be in business.

Q Do you know how much spare capacity for energy the Hoerner-Waldorf plant has from its excess steam?

A Are you asking me that question?

Q Yes, sir.

A I do not know. I know that some years ago, something like ten years ago, I know that, or less than ten years ago, they were shut off for a short period in the winter because of a gas shortage, so that I felt that if, and I feel that energy is interchangeable. While we're talking about electrical energy here, I feel that energy is fluid. If we're short of one type of energy, we're going to be short of another one. So my point is that while I don't know what's available to them, I know that, however, that they are in the category where if we get into a serious shortage, they are the first ones to be shut off.

Q Do you know how much electrical energy the Hoerner-Waldorf plant would need to operate?

A No, I do not.

Q Did you know that they have 32 megawatts of excess capacity from waste steam now?

A No, but I also know they have a permit to double their capacity, and, I think, is that considering their permit?

Q The 32 megawatts is what they don't use now.

A That's what they don't use now, but if and when they double their capacity, will that take that up? I don't know that.

Q Okay. Do you know what the spare capacity is for the state of Montana as a whole in currently wasted steam used by industry?

A No, I don't know that.

Q Do you know what spare capacity there is for the Pacific Northwest as a whole in currently wasted capacity of steam used by industry?

A No.

Q Do you know what it is for the Rocky Mountain states?

A No.

Q Now you make the point in your statement, Mr. White, instead of power requirements doubling in ten years, that it might take twenty-five years to double?

A I don't say that. I'm saying that if that is the situation, past history has shown that the power consumption has doubled every ten years for the last three decades, I believe, or whatever period of time that is. The point that I meant to elaborate on there and didn't in my statement was that I feel that the history of the requirements of electrical energy is more reliable on which to base the future than supposition.

Q All right, sir. Do you have any possible answer to the question which you yourself ask in you statement, "Can you conceive of how it might be bad to over-estimate demand and build in accordance with an over-estimate?"

A No, I can't conceive that that is bad to over-estimate.

Q You can't conceive of any circumstances in which it would be bad?

A No, I really don't. I can't see why because over-capacity of anything leads to generally a cheaper product. I mean if you have more than enough, in our business, you have to get out and sell it at whatever price you can get for it. I'm saying this, what happens if there isn't enough? I can see a severe problem if we don't have enough electrical energy; but if the plants are setting there idle, it's going to be a financial problem certainly to the companies that built it, but I think that in itself is evidence that we're going to need the power. I can't imagine any company going out and spending $500,000,000.00 to $750,000,000.00 for something that they don't in all good conscience believe they need.

Q Mr. White, your business is not a regulated industry, is it, in terms of the price of your product?

A Well, I would consider -- not in the terms that you are speaking it isn't regulated, but it's certainly regulated.

Q Well, you don't have to go before the Public Service Commission to determine what your prices are; do you?

A No, I realize what you're speaking of.

Q Now you make the statement as well, sir, in your prepared testimony that quite a few folks have left farming and rural areas where you yourself had come from.

A That's right.

Q And you recall, of course, your boyhood on the farm with nostalgic pleasure; and then you say, "However, we can't go back, we must move forward." Do you advocate, sir, that more people should leave the farms and come to the cities?

A No, I don't. I think it's an unhappy situation, but it's an economic fact. And the reason, of course, that they did it was because of the mechanization, as I'm sure you know of, on the farms. The problem is now, I mean if we don't keep the energy available for industry, a lot of people may want to go back, but they can't go back; for one, a very simple thing, there aren't enough horses and there are no harnesses for the horses. I mean it's a rather simple situation, but you couldn't go back if you wanted to.

Q You refer to increases in price as automatically causing price increases in other energy sectors. Do you think that increases in price, I should have said as to electricity, would have any other effect besides increasing the prices of other energy sectors?

A Well, I think it goes the other way because oil and gas and coal are used to produce electricity, and I think the increase of those prices has the ultimate effect on electricity. I do feel this, I think any price in either natural or propane gas or coal or petroleum or electricity, I think that it's axiomatic; if one price goes up, it's going to have an effect on the other. It, for nothing else, it forces the people to move into the other area and the demand will have an effect on what that price might be.

Q Price would have an effect on demand, too, would it not?

A Right, either way.

Q True. Now you comment in the final analysis in your statement, Mr. White, that people, the users of energy, are the ones who will either benefit or suffer depending upon whether Colstrip 3 and 4 is not built or built. That, of course, is the ultimate issue which this Board of Natural Resources and Conservation is supposed to determine in this proceeding; isn't it?

A Sure, that's true.

Q And you also applaud the effort to serve society and the future of our nation by spending efforts in a positive way by working toward energy development and new energy sources. Do you have some hope, if not expectation, that the results of that work will be useful?

A Certainly.

MR. SHENKER: Fine. Thank you very much for coming over, Mr. White.

HEARINGS EXAMINER: Thank you, Mr. White.

(WITNESS EXCUSED)

HEARINGS EXAMINER: I guess we have one other public witness, Mr. Porter.

WILLIAM J. PORTER, appearing as a public witness, having been first duly sworn upon his oath, both as to his written direct testimony and as to the oral testimony to follow, was examined and testified as follows:

(THE WRITTEN DIRECT TESTIMONY OF MR. WILLIAM J. PORTER WAS DIRECTED TO BE INSERTED AT THIS POINT.)

William J. Porter

Before I start, I want you to understand that I realize that what I am telling you today is [redacted] based on my personal and company experiences which is just one tiny corner of Montana, but by the same reasoning it is my world and reflects the things most important to my company. I remember when the casualties were reported during the war. We were glad when casualties were reduced to "only one" for the day but the "one" that was killed probably didn't feel that way.

I hope that these comments will help you keep Montana's casualties to zero.

February 5, 1976

STATEMENT ON COLSTRIP 3 & 4

I'm William H. Porter, Jr., 1425 Winne, Helena. I work for American Chemet Corporation in East Helena. We are a small growing company that employees about 47 persons in Montana. Our company produces zinc oxide products and copper oxides by recycling other people's by-products and waste products. We do not require processing these products to a refined metal and then processing back to the chemical. Because of this, we save on the capital costs for refining, the processing costs, and the energy costs.

Our copper oxides are used in animal feeds, fertilizers, and agricultural sprays in ways that increase the quality of the harvest. One such use is as a partial replacement for antibiotics in certain swine programs. This reduces the risk of human ingestion of excessive antibiotics when eating these animals. Copper oxides are also used as an antifouling pigment on the bottom of ocean going vessels. They prevent the growth of crustacea which reduces the power required for propulsion and fuel consumption. Without this treatment, the fuel requirements have been reported to increase at a rate of about 10% per month. These fuel losses would be very wasteful.

American Chemet products conserve recycled raw materials and energy but they still require power to keep up with changing times and competition. We must be assured this power will be available or we must prepare to move to locations where it will be.

In our fiscal years, July 1968 through June 1969, our natural gas consumption was 14,489,000 cubic feet. In our fiscal year July 1973 through June 1974, it was 49,957,000 cubic feet, an increase of 344%. Our electrical usage increased from 701,120 KWH to 1,234,560 KWH during the same period, an increase of 176%.

By December of 1975, our gas usage increased a small amount in spite of changes we made and are making to hold down and reduce consumption. We have budgeted $9500 for an emergency standby oil system and have ordered a new melting furnace that will only use oil even though oil is about twice as expensive as natural gas and is much harder to handle. Our electricity usage in December increased to a yearly rate of 1,918,080 KWH, or 683,520 KWH since July of 1974, almost as much as our total usage in fiscal 68-69.

In July 1974, our net plant electrical load was 275 killowatt amperes and we were operating close to capacity. In anticipation of new needs, we installed a new feeder line capable of 1549 KVA. It will be transferred through the plant in a five year period to modernize and allow for expansion of our facility. The size of our new feeder line was based on a plan that was designed for us by General Engineers, Inc. 215 South Third Street West, in Missoula. This power was and is required for installation of new dust collection equipment, a new grinding facility, a particle classification system, lighting improvements, a new kiln, and an atomization plant. This total electrical power system amounts to 463% increase from the base period. We expected a 200% increase in our natural gas consumption during this same period, but are opting for conservation, electricity, or specific operations relocation. These options will have to be evaluated as the situations present themselves since significant amounts of additional gas are uncertain and we want to avoid the uncertainty of being an interruptable consumer.

Recently we were asked to quote a potential customer on some copper oxides that would have required a 50% increase in our production. The Montana Power Company told us we could not count on delivery of natural gas over 60,000,000 cubic feet per year. Therefore, we considered buying the Medicine Hat Brickyard in Helena, or the old Bonanza Meat Packing Plant in East Helena for their gas supply. The Power Company told us they could not connect us in a new location since they cannot connect new industrial consumers. We were also told the present owners could not even connect their own gas lines for their own use. At that point, I wrote the Governor questioning the value of spending taxpayers money to create and correct an industrial development brochure.

We are all concerned with the uncertainty of our imported supplies of oil and natural gas but fortunately Montana can augment its power requirements with coal and electricity. We have the capability of developing energy independence for ourselves and our neighbors if we choose to.

In the face of uncertainty, a country, a state, or a company must prepare contingency plans. Often times a company's plan is contingent upon a government plan. However, there are limitations. American Chemet's product processing is such that we are unable to use coal. Coal would downgrade our product quality. We use several small heating units which require close controls and are best suited to natural gas, oil, or electricity. We hope to use electricity whenever possible to save our oil and gas for uses where we can't substitute or where we can't afford the capitalization to substitute.

It is my understanding that the public utilities have been granted monopolies in exchange for being regulated by government so that we, the public, will have power available at a fair price. At this point in American Chemet's development, providing power is the most important segment of government's responsibility. The price of oil got high without our approval and will stay high and it is my opinion gas prices will match them. Continuing power shortages will result in still higher prices. If we don't have power, questioning the price is a moot inquiry. Excess energy supplies should stabalize or reduce power costs.

The median labor rate at American Chemet is $46.96 per day. Fringes and related benefits account for 30% more, totaling $61.05 per day. As stated, we have 47 Montana employees. 47 x $61.00 totals $2,867. For the billing period ending 12/13/75, our daily gas bill was $180.30 and daily electric bill was $70.39, for a total of $250.69. This is 8.7% of our payroll. Our power cost is equivalent to four employees but we believe it to be money well spent for without it we couldn't operate. My fellow employees need key man insurance for Redi Killowatt.

We hope that businesses will prosper so our neighbors and sons and daughters and ourselves will be able to have jobs. No one really knows how business will fare, but we have to hope for the best. When preparing for our competition, our concerns are: 1. Do we, or will we, have the required basic tools? The supply of power is the responsibility of the Montana Power Company and the government. As a consumer, I see that the Power Company says there is a need for more power and I know my business needs it. Let's examine the alternatives and the possible consequences as I see them: 1. If the power is available and we do not need it, the Power Company and its stockholders will lose a lot of money. That's their problem. Because extra power would create an oversupply, the price might come down. That would help the public. 2. If the power is not available and it happens that we need it, it is my opinion that government would have made a serious error in its judgement that could cost the people of Montana the right to live here and would affect the standard of living of those who remain. Without needed power, we would all lose. It is my opinion that an error in judgement in this matter would be too costly for too long for too many people to risk this mistake at the expense of all of us citizens. 3. If the power is available and we need it, and I'm sure American Chemet will need it, we will all win. I want Montana to be a winner. I'd rather use Montana electricity than make an Arab or Canadian richer while begging him to sell to me. If Montana has power, Montanans will get their share.

EXAMINATION OF WILLIAM J. PORTER

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Mr. Porter, your statement has kind of a page tacked onto the front of it which is a little introductory statement that I see you've inserted.

A I thought it was going to be verbal.

Q I see. And the information which you blacked out on the first page originally said that you were biased, right?

A That's correct; I think that most of us are.

Q Sure. Now you work for American Chemet in what capacity, sir?

A I'm a vice president of operations.

Q Are you speaking for the company or for yourself personally today?

A I'm speaking for the company.

Q All right. You refer to electrical usage on the second page of your statement, the second numbered page of your statement, and you have it phrased in kilowatt hours. Can you give that to me in kilowatts?

A No, sir.

Q Okay. And, of course, your company is in the position that any sound business is in today of having to evaluate options for the important decisions that they have to make, and one of those important decisions is power availability, right?

A Yes, sir, that's my concern.

Q Okay. Now you make the statement in your testimony, sir, that we, I assume that's Montana, has the capability of developing energy independence for ourselves and our neighbors if we choose to?

A That's correct.

Q Do you know how much energy it would take to develop that independence?

A It would depend on how many neighbors you're going to include.

Q Well, let's start with Montana itself. How much energy would that take; do you know?

A That also depends on whether we're talking about BTU's created by electricity, oil, or gas?

Q Any way you want to take it.

A No.

Q All right. On the fourth page of your statement, Mr. Porter, you look at some possible consequences in alternative senses, and one of the consequences is that the power would be available and not needed. Can you conceive of any circumstances in which that would have any adverse effect upon the people of Montana?

A No, I can't.

Q Your business, like that of Mr. White, I take it, is an unregulated business in the sense that you don't ask the Public Service Commission to determine what your rate structures will be?

A We do not have to answer to the Public Service Commission.

Q Now the last statement that you make in your prepared testimony, sir, is that if Montana has power, Montanans will get their share?

A That's correct.

Q What is the right share?

A It will be dependent upon what the needs of the industries are in Montana and the needs of the growth of the industries that are already here and the needs of the industries that we would like to have in Montana. I think, also, when we talk about shares, we have to consider the shares of the power required for the things that we as citizens use that are brought in from our sister states.

Q Things that are important to citizens?

A Yes, our cars and our furnaces and things like that.

Q All right. Now I take it from American Chemet's standpoint, it matters very little to you what the source or location of the power is so long as it is available to you at a price that is reasonable for your business operations; is that right?

A That's very largely true; yes, sir.

MR. SHENKER: Okay. Thanks very much, Mr. Porter. I have nothing further.

HEARINGS EXAMINER: Thank you, Mr. Porter.

WITNESS: I'd like to say one thing along that, is that we need a lead time on that.

MR. SHENKER: Fine.

HEARINGS EXAMINER: Your statement will be made a part of the record and will go to the board in this matter, Mr. Porter.

WITNESS: Thank you.

HEARINGS EXAMINER: Thank you, sir.

(WITNESS EXCUSED)

HEARINGS EXAMINER: Mr. Labrie, are there any other public witnesses that want to testify at this time? If there aren't, we'll go back with Mr. Labrie.

ROBERT LABRIE, having been previously sworn upon his oath, resumed the witness stand for the continuation of his examination and testimony.

CONTINUATION OF EXAMINATION OF ROBERT LABRIE

Cross, by Department of Natural Resources and Conservation

By Mr. Shenker (continuing):

Q Mr. Labrie, during the time since we interrupted your testimony to go on to the public witnesses, you have had a chance to find the subsequent memorandum after the 1970 memorandum, that's in 1971. That memorandum has now been marked as Applicants' Exhibit number 231.

A That's correct.

Q Okay. If I ask you for another memorandum, will we get another exhibit?

A Not that I have with me. Many people in our company have worked on geothermal and the intention of the data that has been placed in evidence is just to demonstrate that; we haven't wanted to submerge you or the board in copious studies that weren't worthwhile.

Q Well, I certainly appreciate your kindness and consideration, your courtesy in keeping the record as neat as possible. Mr. Labrie, if I understand the chronology now, there is a memorandum in 1969, another one in 1970, a third one in 1971, others that you don't have with you today may be in existence, but you don't know of those?

A I don't know of any others.

Q Right. And finally there is a study done in 1973 by Robert Chadwick, and that's the last one that you know of?

A Yes, and, incidentally, the last two I cannot recall, the one you were cross-examining me on. When I went to look for the others, I found these two accidentally.

Q Okay. Now having found Mr. Chadwick's study, the 1973 study, December of 1973, have you reviewed it?

A No, I have looked at the front of it, and I generally know what's in it. I've looked at the projects which were given first priority rating and I've discussed the general results of the study with Mr. Pete Madison who was in our gas expiration department and followed this work.

Q Is he still there?

A Yes.

Q What was done after Mr. Chadwick's report was submitted?

A I think, as I understand it, we generally reached the conclusion that Mr. Chadwick's report plus the combination of the three other exhibits lent evidence that at this point in time we did not have an economic alternative here in the area of geothermal power to follow further right now.

Q So you gave it up at that time?

A I believe we did continue to follow the Marysville thing; I can't remember when that stopped but it went down the drain not too long ago, and so at the moment, as far as I know, we are inactive in this area.

Q Can you tell me, Mr. Labrie, whether aside from the Marysville project, after Mr. Chadwick's report was submitted, any efforts were made by the Montana Power Company further to consider geothermal as an alternative source of power?

A Could you tell me if the Chadwick Report is dated in December of 1973?

Q December 1973, yes.

A No, as far as I know, the Chadwick Report was considered in the light of the other three papers that discuss the economics and I know that at the time that they discussed this stuff, they also thought about the location of the number 1 priority spots in the Chadwick Report and due to the transmission line costs to develop any of these, they didn't choose to go further.

Q Okay. Well, I assume by your general answer that I know what the answer would be to the specific questions that I have, but I better make sure they are clear for the record. In Mr. Chadwick's report, which I assume will be offered as an exhibit; is that right, Bill?

MR. BELLINGHAM: Yes.

Q In Mr. Chadwick's report, in the form that it came to us, there were a few points that were underlined because he made specific recommendations for further field study, geologic field study or resistivity surveys. Would I be correct in assuming that that work was not done?

A I presume it wasn't; Dr. Fanshaw was following this for our company. and I believe his recommendations were not to go further at this time.

Q Of course, the board will see the exhibit itself, but the way

Mr. Chadwick put it together, he had priorities of recommendations and within each priority he had specific sites which he thought were worth exploring?

A That's correct.

Q On page 6 of the Chadwick Report, which is exhibit 230, Mr. Chadwick has a general discussion on a paragraph labeled, "Purpose," and it says, "Because it is engaged in the public utility business and because of the increased power requirements of its customers, the Montana Power Company is actively pursuing a program of developing environmentally sound methods of securing energy sources to meet this demand. Geothermal energy is such an energy source." Would you agree with that statement?

A Not entirely.

Q I didn't think so.

MR. SHENKER: I have nothing further. Thank you, Mr. Labrie.

HEARINGS EXAMINER: Redirect, Mr. Bellingham?

Redirect, by Applicants

By Mr. Bellingham:

Q You mention, in answer to one of Mr. Shenker's questions, that consultation following submission and review of these various reports, including the Chadwick Report which is Exhibit number 230, I believe, that Dr. Fanshaw recommended that no further work be done regarding geothermal possibilities; is that correct?

A That's my understanding.

Q And who was Dr. Fanshaw?

A He was a consulting geologist that our gas expiration department had retained.

Q Now then, calling your attention to --

A I think he's actually an employee, or he was at that time, but he was considered a consultant.

Q Since then he has left your employment?

A Yes.

Q I understand that from previous evidence. Calling your attention now to Applicants' Exhibit number 230, the Chadwick Report, can you summarize the report itself?

A Well, it generally surveyed the possible or potential geothermal sites in Montana and Idaho.

Q How many sites in Montana; do you recall?

A No, not without checking again. There's a big long list of them. On one page here it has 55 listed, and I haven't gone through them recently to check how many are in Montana.

Q And some are outside the state?

A That's correct. A goodly part of them were in Idaho and, as I recall, the most promising looking ones are actually in Idaho.

Q As far as the Idaho locations are concerned, are there any problems relative to transmission insofar as those sites are concerned, assuming that the geothermal activity there proves successful?

A Yes, it's quite a distance from any of our load centers and, for instance in the case of Island Park, I had occasion to visit the general area and do economic studies on hydroelectric project in that area and the transmission to get the power into our system or even into the Idaho power system would have been quite expensive.

Q Now you mention particularly the Marysville site because, apparently, that has been in the news in recent months, or perhaps in the last year or so. Do you know what has occurred at the Marysville location since the publication, or at least the submittal, of Applicants' Exhibit number 230 to Montana Power Company?

A Yes, I believe that it's been since then that the research project at Marysville has been abandoned. This was, supposedly, a hot rock location where they could insert water down into the rock and it was hot enough so that steam would come bubbling out another hole; and what they found was that instead they had hot water in there rather than hot rock, and it had a much shallower depth, and it wasn't nearly as hot; and because of that, it wasn't an economic site at all.

Q Has it been abandoned as far as you know?

A I believe it has.

Q Are you interested in that site at the present?

A No, not from what we've heard.

Q Do you know of any site in Montana that geothermal power is being produced from at this time?

A No, or in Idaho that would be close enough to our system to be at all attractive.

Q Now then I'd like to call your attention to Applicants' Exhibit number 231. This is a new one that was requested of you, and it's dated April 15, 1971, also signed by R. P.

Madison; is that correct?

A Yes.

Q Now what was the purpose of that particular memorandum?

A Well, I didn't partake in it except to provide some basic information, but it was a follow-up of the work done by Larry Thompson to further help Fanshaw and the exploratory geologists in understanding what degree of geothermal field might be economically attractive enough to study further.

Q Insofar as you know, this was done in the usual and ordinary course of business?

A Yes.

Q I'd like to call your attention to paragraph 4 on page 1 of that particular report. It states there, "Fifty percent probability of success." Will you read the remainder of it, please?

A Pardon me; I didn't hear your last question.

Q Would you read the remainder of paragraph 4?

A "Fifty percent probability of success; this is the probability finding scheme. The probability of finding geysers quality steam in sufficient quantities for the large plant sizes is probably much lower."

Q Well, what was meant by that paragraph?

A Well, the best geothermal site in the world is geysers. Previous papers that are in evidence here mention the other geothermal sites that have been developed, but geysers is by far the best one. It takes, for present-day geothermal development, it takes a geothermal find of quality similar to geysers to be at all economical. This paper that Mr. Madison -- or this study that he performed was based on additional information which he obtained on the geysers field and economics of the geysers field.

Q And then I'd like to call your attention to your prepared statement, page 3 at line 19. We are talking there about Exhibit number 229 which you have previously been interrogated regarding; that is a memo of September 7, 1972 relative to the economics of comparing transmission of generation at Colstrip with the Boardman generation. You're familiar with that particular study, are you not?

A Yes.

Q Do you have it?

A I do have it, yes.

Q And at that particular page and line of your testimony, you state that the freight rate of 6 mills per ton mile for hauling coal from Colstrip to Boardman was based upon data obtained from Portland General Electric Company. Do you know where that data came from?

A It came from the letter which I thought was attached to that exhibit at the back. It's a letter of September 13, 1971, entitled, "Grit File by W. A. Huddleston," and it has in it 5.3 mills per ton mile which the Portland General Electric Company obtained from both Burlington Northern and Union Pacific. When we were doing this study for the four companies, the applicants, this information was submitted by the task force in order to do the study. The 5.3 mills per ton mile in 1971 was escalated to 6.0 mills in 1975 at a 3½ percent escalation factor.

Q Now you refer to the letter dated September 13, 1971, and really it's a memorandum, is it not?

A Yes.

Q And I think that has been previously introduced as Applicants' Exhibit number 214?

A That is correct, yes.

Q The question has arisen the last couple of days relative to why all engineering on the transmission system was stopped, and this was in connection with evidence that was introduced by witnesses representing C. T. Main. Do you know when engineering on the transmission system, we are not talking about the proposed transmission system for Units 3 and 4, was stopped?

MR. SHENKER: I don't know, Mr. Davis. I'm going to object to that. It seems to me that there must be a point at which we draw the line against having Bob Labrie serve as the utility infielder and outfielder for answering all questions that come up in the testimony of all other witnesses. You know, the fact is that this is rebuttal testimony; we know that John Evans and not Bob Labrie had the responsibility for C. T. Main transmission coordination. To ask Bob Labrie that question on redirect examination, obviously has nothing to do with anything asked on cross-examination, obviously has nothing to do with anything in his addendum rebuttal statement that has been offered in evidence. I think it's going way past the line of where we try and control these proceedings.

HEARINGS EXAMINER: Well, I'll permit you to answer with the hope that we won't have to recall you on rebuttal to ask the same question.

MR. BELLINGHAM: Really it's not rebuttal testimony, sir. It's testimony that's been brought out in direct and on cross-examination; all we're trying to do is clarify it and make it clear is all.

HEARINGS EXAMINER: Well, I'll permit it anyway at this time. Maybe we won't have to have an extra rebuttal witness for that particular point if it's significant.

MR. SHENKER: Do you want to make bets?

HEARINGS EXAMINER: Do you know when it was stopped, the stop ordered on the transmission line?

A Yes, I believe that it was in the summer of 1974 that Mr. Evans requested that Charles T. Main cease engineering on the transmission line.

Q Do you know why it was stopped at that time?

A Well, primarily because the decision had not yet been forthcoming on which route to take by the Department of Natural Resources, and they had done about all the engineering they could do before finding out what route to engineer.

Q Costs also entered into that?

A Well, of course we had in mind trying to keep the embedded costs down until we got a decision.

Q Now I think there's been a report within the last couple of days relative to the new high load upon the Montana Power system. Are you familiar with the facts of that?

MR. SHENKER: Maybe what we should agree to do, Mr. Davis, is to have a time set every week when Mr. Labrie can come in and give us news bulletins of what is new. But I think that's a little bit improper, really, on redirect examination of this addendum supplemental witness when it has nothing to do with the cross-examination or the direct examination.

HEARINGS EXAMINER: Well, sustained, if that's an objection. Is that an objection?

MR. SHENKER: By gosh it is.

HEARINGS EXAMINER: Then I'll sustain it.

MR. BELLINGHAM: Well, we would like to let Mr. Labrie assume that it's direct evidence as far as this thing is concerned. It's something that has come up within the last couple of days that we think is of interest to the board, and it should be presented to them. And for us to wait for rebuttal testimony the objection would be made at that time that it was supposed to be put in on direct and it would be improper rebuttal testimony. So our approach is to put it in at this time where we think it should come in; and because it's happened within the last couple of days, it's obvious that we were not able to put it in as prepared written statement, and for that reason, we're offering it in this manner for the simple reason that we know of no other way by which it could be offered.

HEARINGS EXAMINER: Well, what is it; you're getting into loads now with him?

MR. BELLINGHAM: Yes. It's a question of -- not a question -- it's a report of a new record being broken within the last few days relative to the loads of Montana

Power.

HEARINGS EXAMINER: Well, I'll tell you this. I will permit it on rebuttal because there may be some more records between then and now and the time we get there. We might have to do it twice. I don't know what the weather is going to do, but it's setting records every day.

MR. SHENKER: It's been a balmy week.

MR. BELLINGHAM: Well, I can assure the Hearings Examiner before the counsel that it will be coming in on rebuttal, and at that time I expect an objection on the grounds that it's improper rebuttal testimony.

HEARINGS EXAMINER: Well, I'll overrule it then if it's improper.

MR. SHENKER: If it's proper, on the hand --

(Mr. Bellingham continuing)

Q I would now like to ask, Mr. Labrie, in a similar vain, as to whether or not there has been any request by ERDA regarding assessing the future generation for use at the Butte MHD research facility?

MR. SHENKER: Well, there are all kinds of issues that are in this proceeding that I'm sure Mr. Labrie can find out information on, and tell us about in February or March or April. I really think that's beyond the line, I think that that's rather objectionable and I object to it.

HEARINGS EXAMINER: Will you repeat the question?

MR. BELLINGHAM: It's pretty much similar to the last question, and I assume that the Hearings Examiner, in view of his remarks previously made, will allow us to put it on rebuttal which is entirely satisfactory.

HEARINGS EXAMINER: That will be fine; I'll sustain the objection.

MR. BELLINGHAM: No further questions.

HEARINGS EXAMINER: Any re-cross?

Re-cross, by Department of Natural Resources and Conservation

By Mr. Shenker:

Q Is Dr. Fanshaw still around in Montana?

A I don't know.

Q How long ago did he leave the company?

A I don't recall.

Q Well, he was there in '73 when Dr. Chadwick's report was submitted?

A I believe he was, to the best of my recollection he was; and I know that he was the one that headed up the work with Dr. Chadwick, but I don't recall when he left so I can't mesh that with the December 1973 report.

Q I'm a little puzzled about this problem with transmission from Idaho. Maybe my geography is a little weak, but the last time I looked at the map, it seemed to me that if you're going west from Montana, Idaho is closer to the load centers on the Pacific coast than Montana is; isn't that right?

A Let's see the question is Idaho is closer to --

Q Load centers on the Pacific coast than Montana; isn't that right?

A Yes.

Q I thought that was right.

A Well, parts of Idaho are closer than parts of Montana, yes.

Q In fact there's no part of Montana that's closer than any part of Idaho than the westerly boundary of Idaho to any place on the west of Idaho; is there?

HEARINGS EXAMINERS: There's too many questions.

A If you are at the westerly boundary of Idaho, you're right.

Q Good.

MR. BELLINGHAM: Ask him to repeat the question.

MR. SHENKER: Well, Bob understood it, Bill. You don't have your map out, but Bob understood it.

HEARINGS EXAMINER: Well, I'm sure that will be very helpful for the board.

Q Are you looking at the map again?

A Well, I'm just going to have it in front of me if you're going to ask another question.

Q Well, Idaho is still west of Montana; isn't it?

A What?

Q Idaho is still west of Montana; isn't it?

A Parts of Idaho are parts of west of Montana, that's correct.

Q Okay.

A There are parts of Idaho that are east of parts of Montana.

Q But there ain't no part of Montana that is further west than the westerly boundary of Idaho, is there?

A No, sir.

Q Okay. Now about this subject of the C. T. Main Company in the summer of 1974. Can you tell me why, if Mr. Evans gave his instructions in the summer of 1974, it wasn't until March 10, 1975 that the project engineer for C. T. Main Company passed on that tidbit of information to the folks there?

A I don't know. I talked to John Kane from Charles T. Main who I believe was the man that was responsible for the work being done in Montana, and he was the one that told me that as he recalled it was in the summer of '74 when he received these instructions. Then I also checked with John Evans to be sure that his memory checked with John Kane's and they did.

Q You didn't by any chance check the project engineer from C. T. Main's deposition to see what the date of the letter was when he gave his instructions to his people?

A No.

MR. SHENKER: Okay. Thank you, sir.

HEARINGS EXAMINER: Mr. Bellingham?

MR. BELLINGHAM: No further questions.

HEARINGS EXAMINER: No further questions; you are excused.

(WITNESS EXCUSED)

HEARINGS EXAMINER: Call your next witness.

MR. BELLINGHAM: At this time, sir, I would like to offer into evidence additional exhibits, 230 and 231. We have previously, I believe, offered into evidence exhibits 227, 228, and 229, and I would ask leave of the Hearings Examiner to withdraw Exhibit 230 so appropriate copies could be made.

MR. SHENKER: No objection to any exhibits or to the withdrawal for the purpose of copying.

HEARINGS EXAMINER: Very well, the exhibits 227, 228, 229, 230, and 231 are admitted.

MR. SHENKER: I would ask that Exhibit 230 be copied in its present form with the underlinings that are in it because they were part of the discussion that I had with Mr. Labrie.

HEARINGS EXAMINER: Fair enough with you, Bill?

MR. BELLINGHAM: I'm sure they will be in there.

HEARINGS EXAMINER: Just duplicate direct. I guess we don't have any further witnesses for this afternoon, do we?

MR. BELLINGHAM: No.

HEARINGS EXAMINER: Any members of the public wish to participate at this time? (No response) Very well, we'll recess until --

MR. SHENKER: Could we have a little chitty chat before we find out where we are going to recess to for tomorrow.

HEARINGS EXAMINER: Off the record?

MR. SHENKER: Yes, I want to know how many witnesses we're dealing with and when they are coming in and that sort of thing.

HEARINGS EXAMINER: Let's go off the record.

(Off record at 2:55 P.M.)

(RECESS AT 3:00 P.M.)